

DIV. OF FISHES

COMMERCIAL FISHERIES REVIEW

UNIVERSITY
OF MICHIGAN

MUSEUMS
LIBRARY



Vol. 18, No. 1

JANUARY 1956

FISH and WILDLIFE SERVICE
United States Department of the Interior
Washington, D.C.



COMMERCIAL FISHERIES REVIEW



A review of developments and news of the fishery industries
prepared in the BRANCH OF COMMERCIAL FISHERIES

A. W. Anderson, Editor

J. Pileggi, Associate Editor H. M. Bearse, Assistant Editor

Mailed free to members of the fishery and allied industries. Address correspondence and requests to the: Director, Fish and Wildlife Service, U. S. Department of the Interior, Washington 25, D. C.

Publication of material from sources outside the Service is not an endorsement. The Service is not responsible for the accuracy of facts, views, or opinions contained in material from outside sources.

Although the contents of this publication have not been copyrighted and may be reprinted freely, reference to the source will be appreciated.

The printing of this publication has been approved by the Director of the Bureau of the Budget, August 2, 1955. (8/31/57)

CONTENTS

COVER: Menhaden being conveyed on a belt system from the hold of a vessel to the cookers of a reduction plant on the east coast of the United States. Menhaden in 1954 accounted for almost 40 percent of the total catch of all fish and shellfish in the United States and Alaska.

	Page		Page
Reduction of Curd in Canned Salmon Prepared from Frozen Fish, Part II - Effect of pH and Salt Content, by Harry L. Seagran	1		
Utilization of Sea Lions in Alaska, by John A. Dassow	5		
Some Factors Affecting Fluid Loss in Southern Oysters, by Milton Fingerman and Laurence D. Fairbanks	10		
RESEARCH IN SERVICE LABORATORIES:	12	TRENDS AND DEVELOPMENTS (Contd.):	
Manufacture of Experimental Menhaden Fish Meal on a Pilot-Plant Scale, by Maurice Bender	12	Federal Aid Programs Help Restoration	25
Canned Sardine Specification Revised	13	Federal Purchases of Fishery Products	26
Collaborative Program Between Seattle Fishery Technological Laboratory and University of Cali- fornia	14	Great Lakes Fishery Investigations:	
Feeding Fresh-Water Fish to Fur Animals	14	Cisco Returns from Survey Trip of Northern Lake Michigan (Cruise XI)	26
Possible Use of Alaska Fishery Wastes as Poultry Feed	14	Maine:	
Progress on Oyster Research	15	Canned Maine Sardine Consumer-Acceptance Tests	27
TRENDS AND DEVELOPMENTS:	16	Maryland:	
Additions to U. S. Fleet of Fishing Vessels	16	1955/56 Oyster Season Good	27
Alaska:		Underwater Breathing Apparatus Useful to Biologists	28
Secretary McKay Recommends Amendments to Legislation for Gradual Elimination of Fish Traps	16	National Canned Salmon Week	28
American Samoa:		North Atlantic Herring Research:	
Tuna Cannery Extends Contract with Japanese Fishing Vessels	17	Theodore N. Gill Searches for Young Herring (Cruise 8)	29
California:		North Atlantic Fisheries Exploration and Gear Research:	
Pacific Herring Fishery	17	Deep-Water Ocean Perch Fished by Delaware (Cruise 12B)	30
Effect of Trinity Dam on Salmon and Steelhead Runs to be Studied	18	Pacific Oceanic Fishery Investigations:	
Albacore Tuna Seasonal Distribution Explored in Eastern North Pacific (Cruise 55-C-7)	19	Yellowfin Tuna Fishing Trip off Line Islands Completed by John R. Manning (Cruise 27) ..	30
Airplane and Vessel Study Sampling and Measure- ment of Fish Schools (Airplane-Spotting Flight 55-13)	21	Seasonal Tuna Abundance in Line Islands Studied by John R. Manning (Cruise 28)	31
Yellowfin Completes Final 1955 Cruise to Assess Abundance of Sardines, Mackerel, and Anchovy (Cruise 55-Y-9)	22	Albacore Tuna Survey in North Pacific by Charles H. Gilbert (Cruise 23)	32
Market Crab Abundance Under Study:		Skipjack Tuna-Scouting Trip Completed by Charles H. Gilbert (Cruise 24)	33
Robert Croll and Donna (Cruise 55-C-8)	23	Fertility of Eastern Tropical Pacific Studied by Hugh M. Smith (Cruise 31)	33
Josephine and J. F. Pomilia (Cruise 55-C-9) ...	24	South Carolina:	
Cans--Shipments for Fishery Products, January- November 1955	24	Fisheries Biological Research Progress, Septem- ber-December 1955	35
		United States and Alaska Fisheries Production, 1955	36

REDUCTION OF CURD IN CANNED SALMON PREPARED FROM FROZEN FISH

Part II - Effect of pH and Salt Content

By Harry L. Seagran*

ABSTRACT

The liquid-binding power of fish muscle is influenced by salt content and pH and exhibits a zone of minimum effect corresponding to the "isoelectric zone" (approximately pH 5 to 6) of fish-muscle proteins. The retention of fluid on heat processing, with corresponding curd reduction, was shown to depend upon the liquid-binding power of the proteins at approximately pH 6.5 and above in the presence of about 2- to 5-percent salt in the meat. These findings do not support the hypothesis that the reduction of curd formed during the heat processing of brined meat (prepared from frozen fish) is due to a dissolving action of brine on the meat proteins.

INTRODUCTION

Chief among the undesirable characteristics of canned salmon prepared from thawed fish is a surface curd formation as a result of the heat coagulation of soluble protein released during heat processing. It has been observed that treatment of the thawed meat, prior to heat processing, with 70-percent saturated brine for 10 min-

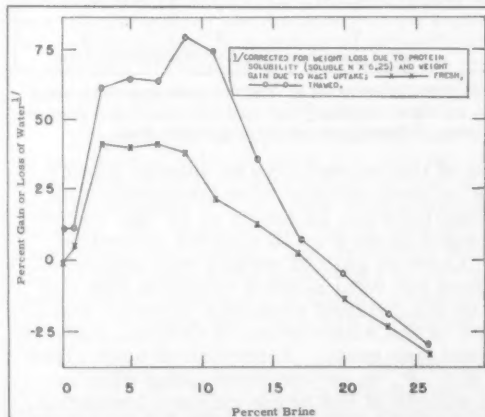


Fig. 1A - Effect of brine concentration on the imbibition of water by fresh and thawed king salmon slices.

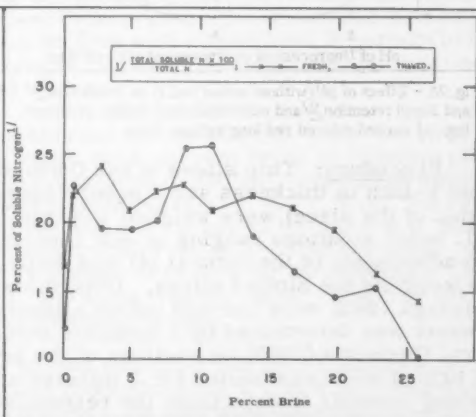


Fig. 1B - Effect of brine concentration on protein solubility of fresh and thawed king salmon slices.

utes is partially effective in reducing curd (Dassow and Craven 1955). Tanikawa et al. (1952) have proposed that the reduction of curd formed during the heat processing of brine fish meat is due to a dissolving action of brine on the meat proteins, and these authors have suggested, for the prevention of curd, as complete a removal of soluble proteins from the surface of the meat as possible.

* Biochemist, Fisheries Experimental Commission of Alaska, Fishery Products Laboratory, Ketchikan, Alaska.

It is well known, however, that brine treatment of the meat prior to freezing or after thawing markedly reduces drip and that this treatment is thus quite effective in preventing the excessive loss of soluble protein. Tarr (1942) has demonstrated that the prevention of drip occasioned by lightly brining fresh and thawed fish muscle at its natural pH is due largely to the ability of NaCl to cause the proteins to bind liquid firmly. Tarr also reports that halibut muscle swells gradually in dilute HCL or NaOH solution, the swelling in acid being almost entirely inhibited by NaCl and that in alkaline solution greatly increased thereby.

In an attempt to explain the effect of brine on fish meat in reducing drip and the curd resulting from heat processing, the general proposals of Tanikawa *et al.* and Tarr of protein solubility and protein swelling in brine have been considered in the present brining studies.

EXPERIMENTAL

EFFECT OF NaCl CONCENTRATION ON PROTEIN SOLUBILITY, IMBIBITION, AND CURD REDUCTION: Both fresh and thawed-frozen red king salmon (*Oncorhynchus tshawytscha*) were used. (Prior to the tests, the frozen salmon were held in storage at -20°F . for 3 weeks.)

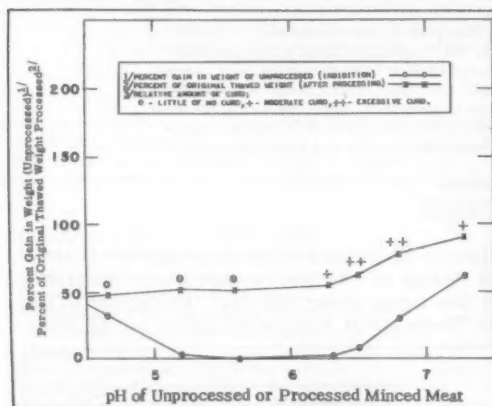


Fig. 2A - Effect of pH (without added NaCl) on imbibition ^{1/} and liquid retention ^{2/} and curd reduction ^{3/} (after processing), of thawed minced red king salmon meat.

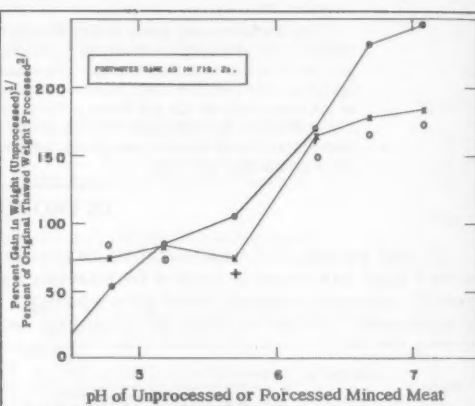


Fig. 2B - Effect of pH and NaCl (3 percent) on imbibition ^{1/} and liquid retention ^{2/} and curd reduction ^{3/} (after processing), of thawed, minced red king salmon meat.

Procedure: Thin slices of the fresh and of the thawed-frozen salmon meat about $\frac{1}{8}$ -inch in thickness and 4 square inches in total surface area (including both sides of the piece) were weighed and then immersed for 16 hours at 68°F . in 100-ml. brine solutions ranging in salt concentration from 0 to 26 percent by weight. No adjustment of the natural pH was made. Loss or gain of weight was measured by weighing the blotted slices. Determinations for total soluble nitrogen (Ma and Zuazaga 1942) were carried out on aliquots of the filtered resultant brines. NaCl content was determined by a modified method of the Association of Official Agricultural Chemists (1950) on sections of the brined fish meat. A portion of each slice of brined meat was heated for 2 minutes at 450°F . in an air-oven along with unbrined controls to determine the respective effects of the brine on curd formation.

Results and Discussion: Immersing the thawed-frozen meat in brine reduced curd formation only if the brine was of certain concentrations (table). If the concentrations were between 1 and 5 percent there was little or no curd formation. Above these concentrations, there was an increasing tendency for the meat to lose imbibed water on heating (with resulting formation of curd) up to a maximum at about

17 to 20 percent brine concentration. Above this level, increasing dehydration of the fish meat occurred with resulting protein denaturation, and little curd was observed on heating. The attainment of equilibrium between meat and water was not demonstrated, however, and the dehydration effect beyond the point of maximum imbibition may not have reached completion (Fougère 1952).

The fresh tissue showed no significant curd on heating, regardless of the NaCl concentration (table).

The tests for imbibition (fig. 1A) and solubility (fig. 1B) were interesting in that the frozen tissue showed a much greater imbibing power than the fresh tissue (Tarr 1942), maximum imbibition occurring at the point of maximum solubility for the protein of the thawed tissue. Except at this point (about 10-percent brine) the thawed tissue essentially showed a slightly lower solubility than the fresh (Snow 1950).

The relatively poor curd prevention in the region of maximum solubility of the protein of the thawed meat would not seem to indicate an obvious relationship between leaching effects of the brine and curd reduction as proposed by Tanikawa *et al.* (1952). In addition, the curd prevention at high NaCl concentrations, where protein solubility is at a minimum, is due to a dehydrating effect rather than to a leaching effect.

The fact that king-salmon meat shows an imbibition maximum at about 10-percent NaCl is in agreement with the findings of Fougère (1952) and Duerr and Dyer (1952), who used cod muscle. The latter authors showed that it is the actomyosin fraction that undergoes denaturation above this NaCl concentration.

EFFECT OF pH AND NaCl ON IMBIBITION AND CURD REDUCTION: On the basis of the retention of imbibed liquid and the resulting curd prevention for the tissue slices immersed in about 1- to 5-percent brine, where the imbibition potential was very strong, a number of experimental studies with and without 3-percent brine at various pH levels were carried out on frozen red king-salmon meat that had been stored 9 months at -5° F. then thawed and minced.

Procedure: A typical experiment was carried out as follows: A series of 40 g. of the thawed minced meat per 200 ml. of water or 3-percent brine at adjusted pH levels (pH adjusted with dilute HCl or NaOH) was held in 250-ml. centrifuge bottles for 16 hours at 36° F. The suspensions were centrifuged at 2,000 r.p.m. for 20 minutes, the supernatant liquid was decanted, and the change in weight due to this treatment was noted. The resultant meat was transferred to $\frac{1}{2}$ -pound flat cans, and the sealed cans were processed at 10- to 12-pounds pressure for 40 minutes. The processed cakes were drained, reweighed, and inspected for curd. The final pH of the entire processed contents of the can was then recorded.

Results and Discussion: These experiments indicated that in the absence of NaCl (fig. 2A) there was minimum imbibition from about pH 5.2 to 6.3. Above pH 6.5 and below pH 5 imbibition increased strongly. At approximately pH 5.5 and below there was no curd on heat processing; above this point curd was present and particularly heavy in the region of about pH 6.5 to 7.

In the presence of 3-percent brine (fig. 2B), imbibition was at a minimum below pH 5, becoming quite strong between pH 5 and 6, and very strong from pH 6 to at least 7.1. On heat processing there was no curd below pH 5, and there was mod-

Relationship of Brine Concentration to Curd Formation on Fresh and Thawed King Salmon Slices Immersed in Brine and Then Heated													
Sample	Amount 1/ of Curd on Control	Amount of Curd on Brined Slices Brine Concentrations--Percent											
		0	1	3	5	7	9	11	14	17	20	23	26
Fresh	0	0	0	0	0	0	0	0	0	0	0	0	0
Thawed	+	+	0	0	0	+	+	+	++	++	++	0	0
1/ 0 - little or none;		+ - moderate;						++ - excessive					

erate curd intermediate between pH 5 and 6. In the range of approximately pH 6.5 to at least pH 7.1, there was a complete lack of curd. In addition, the presence of 3-percent brine at approximately pH 6.5 and above greatly increased the ability of the meat to retain imbibed liquid on processing, liquid retention being closely related to curd prevention.

Thus, the retention of extra-cellular fluids or drip is related to the power of the proteins to imbibe free liquid. This imbibing power of muscle proteins is influenced by salt content and pH and exhibits a zone of minimum effect corresponding to the "isoelectric zone" (approximately pH 5 to 6) of fish muscle proteins (Tarr 1942). The retention of fluid on processing, with corresponding curd reduction, depends upon the liquid-binding power of the proteins at approximately pH 6.5 and above, occasioned by the presence of about 2 to 5 percent salt in the meat.

LITERATURE CITED

Association of Official Agricultural Chemists

1950. Official Methods of Analysis, Seventh Edition, A. O. A. C., P. O. Box 540, Benjamin Franklin Station, Washington 4, D. C., p. 297 (18.7).

Dassow, J. A., and Craven, H. J.

1955. Reduction of Curd in Canned Salmon Prepared from Frozen Fish; Part I - Use of Tartaric-Acid and Sodium-Chloride Brine Dips. *Commercial Fisheries Review*, vol. 17, no. 8 (August 1955), pp. 1-5.

Duerr, J. D., and Dyer, W. J.

1952. Proteins in Fish Muscle; Part IV - Denaturation by Salt. *Journal of the Fisheries Research Board of Canada*, vol. 8, pp. 325-331.

Fougère, H.

1952. The Water Transfer in Codfish Muscle Immersed in Sodium Chloride Solutions. *Journal of the Fisheries Research Board of Canada*, vol. 9, pp. 388-392.

Ma, T. S., and Zuazaga, G.

1942. Micro Kjeldahl Determination of Nitrogen. *Industrial and Engineering Chemistry, Analytical Edition*, vol. 14, pp. 280-282.

Snow, J. M.

1950. Proteins in Fish Muscle; III - Denaturation of Myosin by Freezing. *Journal of the Fisheries Research Board of Canada*, vol. 7, pp. 599-607.

Tanikawa, E.; Inoue, Y.; Akiba, M.; and Numahura, T.

1952. Studies on the Manufacture of Canned Mackerel; Part V - Studies on the Formation of Curd in Canned Mackerel. *Bulletin of Faculty of Fisheries, Hokkaido University, Japan*, vol. 3, pp. 23-30.

Tarr, H. L. A.

1942. Effect of pH and NaCl on Swelling and Drip in Fish Muscle. *Journal of the Fisheries Research Board of Canada*, vol. 5, pp. 411-427.



DO YOU KNOW THAT

An 80-year old Norwegian fishermen of Kjelvik in Finnmark Province in the spring of 1954 caught a halibut weighing 154 pounds. He rowed 1½ hours to Honningsvaag to sell his catch.

--News of Norway, May 27, 1954.

UTILIZATION OF SEA LIONS IN ALASKA

By John A. Dassow*

During the past year, there has been new interest shown in the possibility of commercially utilizing the Steller sea lion, which occurs in large numbers in Alaska coastal waters. Some of this interest arises from the demand for an economical meat, with high-protein and low-fat content, for use as either fur-farm or fish-hatchery feed in the Midwestern and Western states.

STELLER SEA LION

General information on the Steller sea lion is given in the following excerpt from the publication, "The Seals, Sea Lions, and Sea Otter of the Pacific Coast," by Karl W. Kenyon and Victor B. Scheffer, Wildlife Leaflet No. 344, U. S. Fish and Wildlife Service (February 1953).

"The Steller sea lion is the largest of all eared seals. Because of its massive size and 'belligerent' nature, it is seldom seen in zoos and is never trained. It is



Fig. 1 - Measuring sea lion shot in Tongass Narrows--male, weight 800 pounds.

well known to fishermen through its habit of robbing fish from nets, traps, and lines and because it gathers near estuaries to feed during salmon and herring runs. It is named for Georg Wilhelm Steller, the naturalist who accompanied the discovery expedition to Alaska in 1741.

DESCRIPTION: "The adult male weighs up to 2,200 pounds and the female up to 1,000 pounds. At birth, the pup weighs about 35 pounds and is a rich chocolate brown. Within a few months it takes on the buff or yellowish-tan coat of the adult. The large size, light color, and heavy muzzle and head are the best recognition characteristics of the adults. The young of less than a year may easily be confused with the fur seal and California sea lion.

*Chief, Fishery Products Laboratory, Ketchikan, Alaska, operated jointly by the Branch of Commercial Fisheries, U. S. Fish and Wildlife Service and the Fisheries Experimental Commission in Alaska.

"The adult voice is a prolonged, deep-throated, bellowing roar; the male's somewhat lower than the female's. Both make, in addition, coughing and grunting sounds. The pup utters a feeble, prolonged grunt."

RANGE: "The Steller sea lion ranges from the islands of southern California northward along the coast into Bering Sea. The population is roughly estimated at: California 3,000; Oregon 1,000; Washington 500; British Columbia 10,000; Alaska 40,000; total about 60,000. This sea lion is usually found at sea, very rarely in bays."

BREEDING HABITS: "It breeds throughout most of its range. During June and early July the sea lions resort to favorite wave-beaten rocks and islets. Here the male holds a harem of 10 to 20 females. The cow bears a single pup and is bred before she is allowed to return to the sea to feed. The pup lives on mother's milk for at least three months. It does not take to the water for several weeks after birth, although, like the fur-seal pup, it is able to swim weakly from the moment it is born."



Fig. 2 - Butchering sea lion shot in Tongass Narrows--male, weight 800 pounds.

FEEDING HABITS: "Few Steller sea lion stomachs have been analyzed. Many more are needed as evidence of the year-round diet. During salmon and herring runs, sea lions gather in straits and at river mouths to feed. Sight observations, however, may be misleading. The stomach of a sea lion killed near the mouth of the Klamath River during a salmon run contained no salmon, but it was packed with lampreys, fish which prey extensively on salmon. Other sea lions, killed in and near fish traps, contained salmon. Yet, during much of the year, sea lions feed where no commercially-valuable fish are present. The contents of approximately 50 stomachs containing food revealed a diet of squid, sand lances, pollock, flounders, sculpin, cod, herring, small sharks, skates, perch, and various other scrap fishes; with small amounts of salmon, halibut, and sablefish."

"Many more sea lion stomachs are needed before conclusions can be drawn as to the over-all damage to the food-fish industry. Fishermen should save sea lion stomachs, either frozen or pickled in formalin, for analysis, with information as to when, where, and by whom they were taken. For further details, consult your local fishery agencies."

"Vigorous statements of the damage inflicted by sea lions to fishing are often heard. No doubt exists that in certain areas sea lions interfere materially with fishing activities. However, before any control measures can be effectively taken, fishermen should present evidence consisting of exact locations, dates, the number of animals involved and, whenever possible, the stomachs of sea lions killed. Without this specific information, a sea lion control program might represent time and money wasted, since large numbers of sea lions exist where no fishing is carried on. In order to be effective, a control program must be concentrated where damage to fishing and fisheries occurs."

REGULATIONS

The Fish and Wildlife Service regulations pertaining to sea lions are of interest to anyone planning their utilization. Under the Code of Federal Regulations (Title 50 Chapter 1-G), Part 142, "Protection of Alaska Sea Lions," was amended by the Secretary of the Interior on April 7, 1949, as follows:

"**AUTHORITY:** This amendment is issued pursuant to the Act of June 16, 1934 (48 Stat. 976; 16 U.S.C. 659).

"**Basis and Purposes:** On the basis of widespread complaints from fishermen, information produced at public hearings, written briefs submitted by members of the fishing industry, observations by personnel of the Fish and Wildlife Service, and a scientific investigation described in Special Scientific Report No. 28 of the Fish and Wildlife Service, it has been determined that sea lions occur in excessive numbers in the waters of Alaska and are inflicting serious economic loss on the fisheries. The protection of the herd at Bogaslof Island will prevent the extinction of this animal as a species of interesting sea life in such manner as will not be detrimental to the Alaskan commercial fisheries. Accordingly, to reduce the abundance of sea lions, the following provision is adopted, to become effective 30 days after its publication in the Federal Register.

"Section 142.1 is amended to read as follows:

"s 142.1 Killing of sea lions. The killing of sea lions in the Territory of Alaska, or in any of the waters of Alaska over which the United States has jurisdiction is permitted, except on Bogaslof Island and within one statute mile of the shores of Bogaslof Island."

EVALUATION OF POSSIBILITIES FOR UTILIZATION

For study of utilization possibilities, the Service's Alaska Fishery Products Laboratory obtained during November 1954 to January 1955 four specimens of the Steller sea lion from local groups in Tongass Narrows (adjacent to Ketchikan). The proximate composition of samples of meat, liver, and blubber from each animal was determined and is summarized in table. In taking samples of the meat, the blubber (fat) was trimmed carefully in order that only lean meat was analyzed. Both meat and liver were found to be high in protein (20 to 24 percent) and fairly low in oil (1 to 4 percent). The protein content compares favorably with that for horse meat and lean whale meat, both of which are used extensively in animal feeds. The liver was found to be approximately 3 percent of the total weight of the animal. Based on 2.8 percent-oil content, one sample of liver assayed 302,000 spectrophotometer units of vitamin A per pound, or 23,800 units vitamin A per gram of oil.

Both the sea lion meat and liver were found to be an acceptable human food; however, taste tests at the Laboratory and trials by staff personnel at home have shown that appetite appeal is lacking once the novelty wears off. Probably part of this is a matter of esthetic appeal. The meat is dark red and dense, being most acceptable

as a pot roast, as ground meat in burgers, or as meat balls with spaghetti. The liver is coarser and less tender than beef liver but of good flavor. It would not appear that there would be any market for sea lion meat and liver as food for humans, outside of emergency rations or as a low-cost protein food in foreign feeding programs.

Although no laboratory feeding tests have been made, sea lion meat seems to have considerable appetite appeal for cats and dogs, judging from comments of a half-dozen local residents using it for pet feeding. The liver is equally acceptable. This suggests the possibility of marketing the frozen meat and liver in 1-pound waxed cartons for pet food.

Proximate Composition^{1/} of Components of Sea Lions Obtained November 11, 1954, December 6, 1954, January 9, 1955, and January 12, 1955, near Ketchikan, Alaska

Sample	Component	Moisture	Oil	Protein	Ash
		Percent by Weight			
Sea lion No. 1 Male (Weight 800 lbs.)	Blubber	20.1	^{2/} 73.4	5.5	.2
	Liver	74.2	2.8	20.8	1.1
	Meat	74.3	2.6	23.0	1.1
Sea lion No. 2 Male (Est. weight 1,000 lbs.)	Blubber	16.5	77.6	4.4	.2
	Liver	71.9	4.2	20.4	1.1
	Meat	75.0	1.4	23.8	1.1
Sea lion No. 3 Female (Weight 654 lbs.)	Blubber	11.9	83.9	4.2	.2
	Liver	74.1	3.5	19.4	1.1
	Meat	73.6	1.4	24.5	1.1
Sea lion No. 4 Male (Est. weight 800 lbs.)	Blubber	14.0	78.7	4.8	.2
	Liver	72.8	3.4	21.0	1.1
	Meat	74.0	2.1	23.0	1.3

^{1/} Analyses were made according to the methods of the Association of Official Agricultural Chemists, 1950. Each value reported is the average of one set of duplicate analyses. Analyses by John L. Iverson, Fisheries Experimental Commission, Fishery Products Laboratory, Ketchikan, Alaska.

^{2/} The analysis of this sample of sea lion blubber oil showed the following characteristics:

Iodine value	142.7	Refractive index at 25° C. . .	1.4726
Saponification value. .	190.6	Cloud point of oil.	85° F.

Note: Comparative data for protein and fat content of horse meat and whalemeat: Horse meat: protein 15 percent; fat 3 percent; Whale meat, lean: protein 20 percent; fat 4 percent.

(From Food Composition Tables for International Use, Nutritional Studies No. 11, Food and Agriculture Organization, Rome Italy, March 1954).

The only information available indicates that sea lion meat is good feed for ranch fur animals, provided that excess blubber is carefully trimmed to produce a low-fat content. Controlled feeding tests would certainly be desirable before large quantities are obtained for such use. The acceptance of whale meat for fur-farm feeding would seem to indicate that sea lion meat also would be acceptable.^{1/}

Another market would be as trout or salmon feed in Federal and state hatcheries. Previous surveys (1952) by this Laboratory have shown considerable need for low-cost protein feeds in fish hatcheries as a substitute for liver and horse meat, which are in limited supply and scarce on occasion. Preliminary inquiry indicates considerable interest by hatchery operators in obtaining sea lion meat at a price competitive to other feeding materials.

In regard to utilizing the balance of the sea lion carcass (the hide, viscera, bones, blubber, etc.), possibilities are present but look rather slim. The hides on tanning produce a heavy-bodied leather which can be split to make a soft durable

^{1/} According to the "Fishery Products Report S-226" of November 22, 1954, Market News Service, U. S. Fish and Wildlife Service, Seattle, Wash., imports of Norwegian whale meat entering the United States increased from 60,000 pounds in 1952 to more than 2,000,000 pounds in 1954. Most of it was used for animal feed, especially mink.

leather suitable for leather specialty goods--belts, handbags, jackets, and other tourist items. We have been advised on several occasions by large tanners that sea lion leather is of no commercial value because the hides have too many defects, e.g., scars and cuts. Apparently this would be no deterrent for specialty goods and tourist items which could be sold in Alaska.

Reduction of the blubber, bones, viscera, and remaining carcass to meal and oil would be practical in Alaska if (1) large quantities could be obtained--50 to 100 tons per day, for example and (2) carcasses could economically be hauled to a central reduction plant now operating. Both of these possibilities are rather slim. In the table data are given for the analysis of one sample of blubber oil as an indication of its characteristics for industrial purposes.

It is possible, of course, that a small floater reduction plant might combine operations with a refrigerated vessel which would freeze the meat and liver. The economics of this would have to be carefully studied. If existing equipment were available and idle and could be outfitted with no great investment, a trial operation might be worthwhile. The great rookeries of Southeastern Alaska, Kodiak Island, or the Alaska Peninsula would probably be good bases for a summer operation.

In conclusion, there appear to be several major problems in considering utilization of sea lions:

- (1) Lack of definite information on numbers and availability of animals at central locations.
- (2) Economics and practical aspects of slaughter and recovery of the large animals, either in open water adjacent to rookeries or on the rookeries.
- (3) Economics of meat recovery. Estimated lean-meat recovery not over 40 to 50 percent of carcass. Necessity of trimming blubber to produce a low-fat product for animal feed.
- (4) Probable necessity of using refrigerated vessel and floater reduction plant for recovering and processing, since summer herds of sea lions school in fairly isolated waters and rookeries some distance from existing cold-storage and reduction plants.
- (5) Problem of hide disposal. Leather not suitable for most industrial purposes; possibility of marketing in leather specialty goods.

The most economical operation would be one in which the entire animal could be utilized, enabling the operational costs to be deducted from several products rather than one. The preparation of frozen lean meat for animal feed, the reduction of the remaining carcass to meal and oil, and the preservation and later tanning of hides for the leather specialty market appear to be the most promising possibilities at present.

LITERATURE CITED

- Wigutoff, Norman B.
1952, Potential Markets for Alaska Salmon Cannery Waste. *Commercial Fisheries Review*, vol. 14, no. 8 (August), pp. 5-12 (Sep. No. 320).



SOME FACTORS AFFECTING FLUID LOSS IN SOUTHERN OYSTERS^{1/}

By Milton Fingerman* and Laurence D. Fairbanks*

BACKGROUND

The conditions under which fluid loss (bleeding) occurs in the Southern oyster (*Crassostrea virginica*) have been investigated. The quantity of fluid lost from shucked oysters was first determined. These preliminary experiments led into more complicated experiments in which the changes in the salinities of the body fluids of oysters which were maintained in water with different salt concentrations were determined.

EFFECT OF SHUCKING METHOD ON FLUID LOSS

The fact that commercially-shucked oysters lose a large volume of fluid is common information. Consequently, experiments were designed to determine the amount of fluid lost from oysters after shucking. Oysters which had been removed from their shells in a manner that ruptured the underlying tissues lost 50 percent of their original body weight as fluids in two hours (fig. 1). Most of the weight loss occurred in the first 15 minutes following shucking. Oysters which had been removed from their shells with no damage to the underlying tissues by gently scraping the muscle attachment from each shell lost 25 percent less weight than did the oysters which had been punctured when shucked (fig. 2). The fluids were lost from the oysters shucked with a minimum of injury by bleeding through the ends of the muscle and from fluid spaces in the body proper.

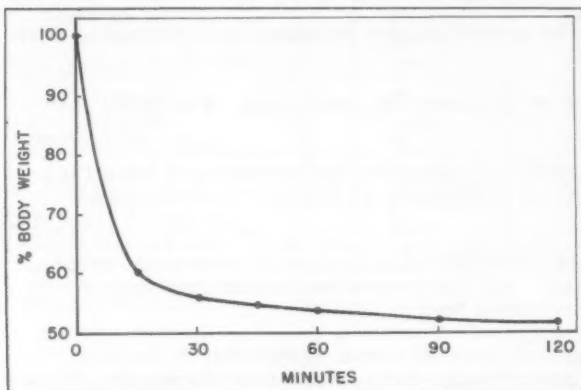


Fig. 1 - The weight changes of the body of oysters after shucking. The mantle and pericardium were intentionally ruptured during the shucking process.

EFFECT OF STRESS FACTORS ON FLUID LOSS OF SHELL OYSTERS

A hypothesis has been set forth that oysters, by virtue of the ability to close their shells freely, are able to "escape" from their environment whenever an unfavorable environmental factor is present. Consequently, oysters have presumably not evolved complicated defense mechanisms because of their ability to shut off the environment under conditions of stress. The fluid content of oysters seems to be extremely labile and subject to rapid changes of quantity in times of stress.

Experiments were, therefore, designed to test this hypothesis and determine some of the conditions under which fluids and consequently weight are lost by oysters. In view of the hypothesis presented above, the most obvious experiment was to prevent the oyster from freely opening and closing its shells and determine the effects of this treatment upon the weight and fluid content of the oyster. Wedges

*Dept. of Zoology, Newcomb College, Tulane University, New Orleans 18, La.

^{1/}This study was conducted by Tulane University under contract with the U. S. Fish and Wildlife Service. It was financed with funds made available under provisions of P.L. 466, 83d Congress, approved July 1, 1954 (commonly called the Saltonstall-Kennedy Act).

were, therefore, placed between the shells to prevent their complete closure. The oysters were weighed at intervals up to 150 minutes and the percentage change of the body weight was determined. Oysters which had been wedged open lost approximately 30 percent of their body weight by secreting fluids from the body into the space between the shells. This loss of weight occurred in wedged oysters kept in sea water and in air. Obviously oysters must be free to open and close their shells if they are to maintain a constant body weight and fluid content.

The next series of experiments was designed to determine some of the conditions under which the loss of fluid in oysters which had been wedged open could be altered. Oysters which had been wedged open were placed in normal, diluted, and concentrated sea water and weighed at several time intervals. The amount of fluid lost varied with the environment. Wedged oysters lost the most weight in concentrated sea water, and the least in diluted sea water. These data could be explained as a simple osmotic phenomenon.

EFFECT OF SALINITY ON COMPOSITION OF SEVERAL BODY FLUIDS

Additional experiments were, therefore, designed to determine how the salinity of the environment influenced the weight and salt content of unwedged oysters. Oysters were, therefore, placed in sea water of several different salinities. At selected intervals the salinities of the several body fluids and the weights of the oysters were determined. The normal oysters in the water of different salinities neither gained nor lost weight yet the salinity of some of the body fluids changed. Obviously free movement of the shells allows the oyster to control its weight. Since no weight changes occurred, the oysters were not gaining or losing water in the different salinities, they must have changed the salinity of some of their body fluids by gaining or losing salt rather than water.

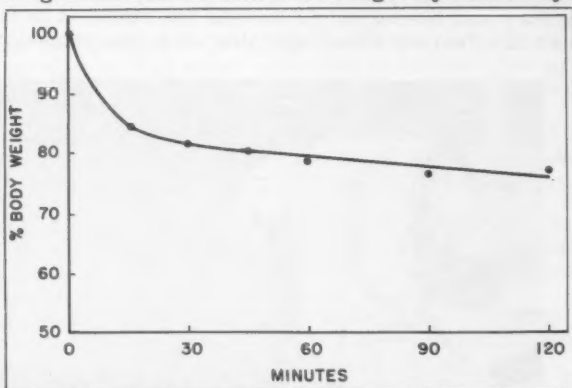


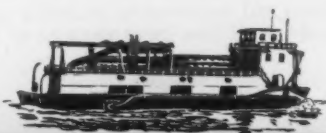
Fig. 2 - The weight changes of the body of oysters shucked without injury to the mantle or underlying parts.

By carefully opening oysters the fluids from several portions of the body could be collected individually. As a result of determination of the salinity of these fluid fractions taken from oysters in several environmental salinities, the observation was made that the deeper in the oyster one obtained the fluid, the less tendency was there for the salinity of the fluid to follow changes in the salinity of the environment, i.e. the blood in the heart showed the least change of all the fluids investigated.

The results were compared with data published for the Japanese oyster. The salinity of the blood of the latter oyster readily follows changes of the salinity of its environment which is not true of the Southern oyster. Evidently the Southern oyster is better adapted to life in an environment with changing salinity than is the Japanese oyster.

The oysters used in the experiments described herein were first and second year oysters. From the weight of the shell alone, one can determine with reasonable accuracy the age class to which the oyster belongs.

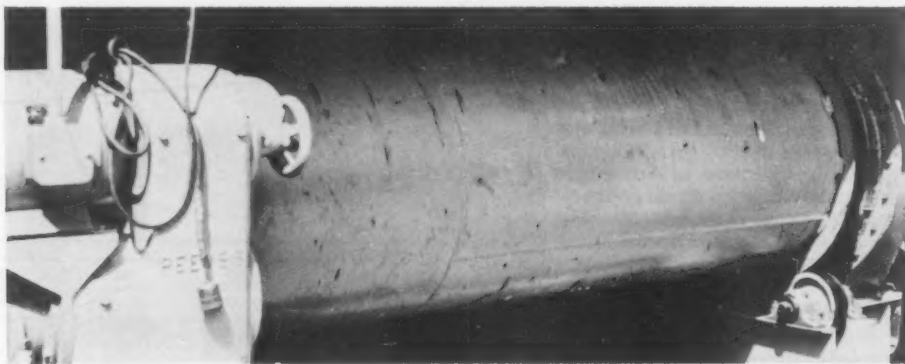
The data will be published in detail in a forthcoming issue of Tulane Studies in Zoology.





MANUFACTURE OF EXPERIMENTAL MENHADEN FISH MEAL ON A PILOT-PLANT SCALE

One of the major problems confronting the menhaden industry is the control of processing variables so that satisfactory meals can be made consistently by the best available production equipment at reasonable costs. When one considers the capital expenditure for plant, equipment, etc., which is in use only 6 months at the average factory and indeed only 2 months for some, it becomes an even more important item than in a factory which operates on a year-round basis.



Cylinder of pilot-plant dryer.

During the summer and fall of 1955, staff members of the Fishery Technological Laboratory, College Park, Md., produced menhaden meals with pilot-scale equipment at one of the menhaden fishery centers. The pilot plant was supplied by a manufacturer of large-scale equipment to a commercial plant which serviced and maintained it for the use of Service personnel.

In the production of menhaden meal with the equipment generally used today there are theoretically about 15 variables which can be adjusted to alter the final products. In the case of the pilot plant it was not feasible to study all of these variables. The pilot plant consisted of four basic pieces: the cooker, the press, the beater, and the dryer. There was also a centrifuge available to separate oil from the press liquor. The fish were fed directly from a hopper to a 6-inch screw auger which carried the fish in a tight cylinder about 6 feet long while cooking. The fish were cooked by live steam introduced into the cooker through several manifolds. The amount of steam and the duration of cook could be controlled within limits.

The press, to which the cooked fish were next brought, was a continuous Ren-nenberg press about 4 feet long and $2\frac{1}{2}$ feet in diameter. It was essentially a constant diameter cylinder containing a tapering screw auger with the small end at the inlet to the press. The press liquor was extracted through screens which formed the walls of the cylinder. This press had a variable-speed driving motor. Attached to the motor was an industrial analyzer which permitted, in part, the determination of the power required to operate the press under different conditions.

The resultant press cake was broken up by means of a beater consisting of a power-driven shaft with numerous rodlike side arms rotating at high speed. The action of this beater broke the large pieces of press cake into smaller lumps so that there was a larger surface area per unit weight exposed to the drying action in the dryer.

From the beater the press cake was conveyed by means of a drag-chain elevator to the dryer. The dryer was heated by a gas-fired furnace which supplied a forced draft of hot air to the large drying cylinder about 5 feet in diameter and 15 feet long. The speed of rotation of the drying cylinder could be controlled to determine the time of travel of the scrap. The heat of the air in the dryer could also be regulated, but not the air speed.

After passing through the dryer the scrap fell through a trap door for collection. The air went through a cyclone separator to trap small particles of scrap. The cyclone separator acted as a collection unit when another type of drying cylinder, known as the "Dehydromat," was used during the last week of the experimental period. However, it is necessary to grind the press cake to much smaller particle size to use this dryer successfully. The pilot plant, as presently designed, did not include such a grinder and the trial with the "Dehydromat" dryer was not successful.

During the past summer and fall the staff found that the present design does not permit a satisfactory degree of control for all processing variables. For example, the cooker originally supplied had to be modified several times because the capacity was such that even when operating at the slowest speed with the least amount of steam introduced to cook the fish there were too many fish for the press to handle. This obviously prevented operation of the press at any but the highest speed. Other difficulties, such as wrong pressure valves on the gas supply to the dryer and absence of a press-cake grinder, also plagued the operators.

Nevertheless it was possible to study the effects of such variables as size and quality of raw fish, degree of cook, and temperature of drying on resultant meals. The effect of these variables on the nutritive quality of the meals produced will be determined by chick and broiler growing tests this coming winter.

--BY MAURICE BENDER, BIOCHEMIST,
FISHERY TECHNOLOGICAL LABORATORY,
BRANCH OF COMMERCIAL FISHERIES,
U. S. FISH AND WILDLIFE SERVICE,
COLLEGE PARK, MARYLAND.



CANNED SARDINE SPECIFICATION REVISED

A proposed revision of Federal Specification PP-S-51 (Sardines, Canned) has been prepared by the U. S. Fish and Wildlife Service and the Quartermaster Corps Food and Container Institute for the Armed Forces. The specification incorporates requirements for Federal purchases of Pacific and of Maine sardines. It has been submitted to members of the sardine industries for comment. This draft, dated November 21, 1955, has not been approved and is subject to modification.



COLLABORATIVE PROGRAM BETWEEN SEATTLE FISHERY TECHNOLOGICAL LABORATORY AND UNIVERSITY OF CALIFORNIA

A collaborative study has been started under the Saltonstall-Kennedy research program wherein employees of the U. S. Fish and Wildlife Service's Seattle Technological Laboratory work in the Food Technology and Poultry Husbandry Department Laboratories of the University of California at Davis. Two programs are currently under way: (1) concerning the nutritive value of fish meal, and (2) the oxidative deterioration taking place in the meat of fish, fish meal, and fish oils which results in rancidity and discoloration. The latter program is under way at the Food Technology Department of the University of California where much important research of a similar nature has been carried out in the past on meats and other foods. The experience and findings from research on these other foods is now being adapted to problems of the fisheries in the current collaborative program.

During November a three-day meeting was held at the Seattle Fishery Technological Laboratory to acquaint the new collaborative employees and University of California staff supervisors with special problems of the fisheries. Discussions and demonstrations were directed toward pointing out problems in the fisheries which differed from those dealing with other foods. At the same time the University of California personnel were able to suggest several important applications of techniques used in research on other food products which will benefit other correlated projects being carried out at the Seattle Laboratory.



FEEDING FRESH-WATER FISH TO FUR ANIMALS

Sheepshead, carp, goldfish, burbot, and gizzard shad are species of fish from the Lake Erie area that may be used for feeding fur animals. Of these, only sheepshead were found to have no thiaminase when the whole fish were assayed. The other species in the particular series of samples tested, contained this enzyme in considerable amounts. This does not prohibit their use for feed, but it means that the fish will have to be cooked, or fed in a special feeding schedule.

The protein content of the whole fish was found to vary from 14 to 17 percent in the samples analyzed. The fat content was lowest in burbot, namely, 5 percent; then sheepshead, 8 percent; goldfish, 11 percent; carp, 12 percent, and highest in the gizzard shad, 18 percent. The fish can be classed as medium fat except for the gizzard shad.

Samples of fresh-water fish will be analyzed from time to time so data will be available on the effect of factors, such as geographical location and season, on nutrient content.



POSSIBLE USE OF ALASKA FISHERY WASTES AS POULTRY FEED

In Alaska, as in other fishing areas, the disposal of fish and shellfish wastes is always a problem. One of the possible methods for partially or wholly utilizing the waste material is to process the waste into meal for use in poultry feeding. Little information is available, however, concerning the feeding value of certain meals which could be produced from material available in Alaska. To obtain such

information, the Fishery Products Laboratory at Ketchikan has prepared experimental meals from pink salmon eggs, pink shrimp waste, and dungeness crab waste. These experimental meals are now being evaluated at the University of California and the University of Wisconsin for protein quality and unknown growth factors when used as poultry feeds. These universities are two of the contractors participating in the U. S. Fish and Wildlife Service research program now under way with funds made available under Public Law 466, commonly referred to as the Saltonstall-Kennedy Act.



PROGRESS ON OYSTER RESEARCH

The fourth bi-monthly report has been received from the group at Louisiana State University describing the research in progress with Louisiana oysters. The frozen oysters have been stored for six months, with no marked changes observed to date. Data on composition of oysters collected by the State from specific areas representing typical seed and growing areas have accumulated to the stage where certain seasonal trends are becoming evident. The group has also developed and evaluated two quick colorimetric tests for approximating the total bacterial count of fresh oysters. These tests may be of value in plant sanitation control or to indicate the probable storage life and general quality of oysters.



YELLOW DISCOLORATION IN FROZEN LOBSTER MEAT

Experiments carried out in Halifax, Canada, show that the yellow discoloration and the accompanying off-flavor that develop in stored frozen lobster meat appear to be associated with the oxidation of the red pigment to a yellow one. The oxidation occurs especially in the tips of the claws, which have a higher fat content than the rest of the meat. Development of discoloration is rapid in the window and open-seam push-cover types of can, neither of which should be used. The use of sealed cans, or vacuum pack cans, coupled with quick freezing and storage at low temperatures, should prevent any discoloration. Antioxidants, such as ascorbic acid, may also be effective.

--Atlantic Fisheries Experimental Station
Circular No. 2, 1953,
Fisheries Research Board of Canada.



TRENDS AND DEVELOPMENTS

Additions to U. S. Fleet of Fishing Vessels

Fishery-craft first documents were issued to 41 vessels of 5 net tons and over during October 1955, according to the U. S. Bureau of Customs. This was an increase of 3 vessels, compared

U. S. Vessels Issued First Documents as Fishing Craft, October 1955 and Comparisons

Area	October		Jan.-Oct.		Total
	1955	1954	1955	1954	1954
	(Number)				
New England . . .	1	-	17	22	23
Middle Atlantic. .	1	-	12	14	15
Chesapeake. . . .	10	8	44	84	93
South Atlantic . .	11	13	61	110	119
Gulf.	15	10	92	293	313
Pacific	3	4	110	104	117
Great Lakes . . .	-	2	7	5	6
Alaska	-	1	31	24	27
Hawaii	-	-	3	1	1
Puerto Rico . . .	-	-	-	-	2
Unknown	-	-	-	-	1
Total	41	38	377	658	717

Note: Vessels have been assigned to the various areas on the basis of registered home ports.

time as fishing craft, compared with 658 for the corresponding period a year earlier--a decrease of 43 percent.

with the number of fishing craft documented for the first time during the corresponding month of 1954.

In October 1955, the Gulf area led all others with 15 newly-documented craft, followed by the South Atlantic area with 11, the Chesapeake area with 10, the Pacific area with 3, and the New England and Middle Atlantic areas with 1 each. The Great Lakes, Alaskan, Hawaiian, and Puerto Rican areas had none.

During January-October 1955, a total of 377 vessels were documented for the first



Alaska

SECRETARY MCKAY RECOMMENDS AMENDMENTS TO LEGISLATION FOR GRADUAL ELIMINATION OF FISH TRAPS: Secretary of the Interior Douglas McKay on January 3, 1956, recommended three amendments to proposed legislation for the gradual elimination of salmon traps in Alaskan waters which was given the Department's general endorsement late last year.

In a letter to the House Committee on Merchant Marine and Fisheries, Secretary McKay said that the people of Alaska had supported a ten-year period for elimination of the traps. In view of this, Secretary McKay said, he felt that this period should be set in the legislation rather than the five-year period proposed in H. R. 242.

The Secretary recommended that appropriate amendments be made so that fractions do not count in applying the percentage formula to determine the number of traps to be closed each year.

He also suggested that all existing traps count as a base whether they are in actual operation or have been voluntarily closed at the Department's request. The formula in the proposed legislation, he said, would work a hardship on those who have cooperated in the Department's conservation program by voluntarily closing their traps.



American Samoa

TUNA CANNERY EXTENDS CONTRACT WITH JAPANESE FISHING VESSELS: The Saipan Maru, owned by a Japanese fishing company, has been operating as a floating cold-storage plant at American Samoa under a 6-months' contract with the United States firm operating the cannery on that Island. Recently the contract was renewed until November 1956, according to a translation made from Nippon Suisan Shimbum, a Japanese trade publication. The Saipan Maru (3,737 tons) was scheduled, however, to return to Japan temporarily, sailing from American Samoa about December 23, 1955. During its absence from Samoa its functions will be performed by the Chikuzen Maru (700 tons).

The number of fishing vessels to operate out of Samoa during 1956 will be 18, and the amount of fish to be taken by the United States firm will be 7,570 tons. Prices per ton to be paid the Japanese company by the United States firm will be: \$275 for albacore; for gilled yellowfin under 90 pounds \$180, from 90 to 130 pounds \$140, over 130 pounds \$100; for spearfish and miscellaneous species \$100.



California

PACIFIC HERRING FISHERY: Man has been playing a part in California's Pacific herring (Clupea pallasii) drama for more than 80 years. As early as 1875 there was a well established gill-net fishery in San Francisco Bay. Continuous statistics on the State's fish landings have been available since 1916 and in that 40-year period there has been a small, moderately steady herring fishery averaging less than a million pounds per year. Gill nets, beach seines, and lamparas have made these catches. The fish are sold fresh, salted, pickled, frozen, etc., and have been used for human consumption, chicken feed, and bait, according to the December 1955, Outdoor California, published by California's Department of Fish and Game.

Over the years Tomales and San Francisco Bays have been the most consistent producers of herring but good catches are often made in Monterey Bay. In the Monterey area the fish are taken in the summer--not during the winter and spring spawning runs.

Superimposed on the small fishery described above have been three short-time booms which resulted in landings of eight million to over nine million pounds in each of the three peak years.

The first during World War I lasted four years. The bulk of the catches was canned or reduced to fish meal but the canned product was not appetizing and did not sell well. Reduction of whole fish was stopped by a law enacted in 1921 which made it necessary to obtain a reduction permit from the Fish and Game Commission. No permits to reduce California herring have been issued.

A second peak occurred in 1948. Again the fish were used for canning, but most of the product tended to break up in the can and the flavor was not such as to encourage repeat orders.

The third boom lasted three years, 1951-53. Part of the herring were canned for export and part went into canned pet food. Neither type of product sold well.

By way of contrast with the bulk of the canned herring, one very tasty product was developed, but it proved so expensive to prepare that the canner abandoned the process.

Since 1953 there has been pressure on the Commission to issue permits for the reduction of herring into fish meal, especially in the Tomales Bay area. Because of the failure of the sardine fishery, numerous sportsmen and some commercial fishermen are afraid that if the herring were thrown open to reduction this fishery would share the sardines' fate. They insist that the herring must be retained to serve as forage fish for salmon and other predacious species.

Based on studies made by California's marine biologists it was recommended that no reduction permits be issued unless the Legislature first gives the commission the power to limit the catch of herring by all methods.

EFFECT OF TRINITY DAM ON SALMON AND STEELHEAD RUNS TO BE STUDIED: Detailed salmon and steelhead studies, to be conducted both by California's Department of Fish and Game and the U. S. Fish and Wildlife Service, will begin in 1956 to determine effects of Trinity Dam on their runs.

Groundbreaking ceremonies on the big dam, being built by the Bureau of Reclamation, were held in October 1955, but it will be several years before the stream used by the fish is blocked.

Many miles of spawning area above the site near Minerville, Trinity County, will be cut off by the dam.

Already written into the authorization legislation is a provision that no less than 150 cubic feet of water per second must be released into the river below the dam for fish life.

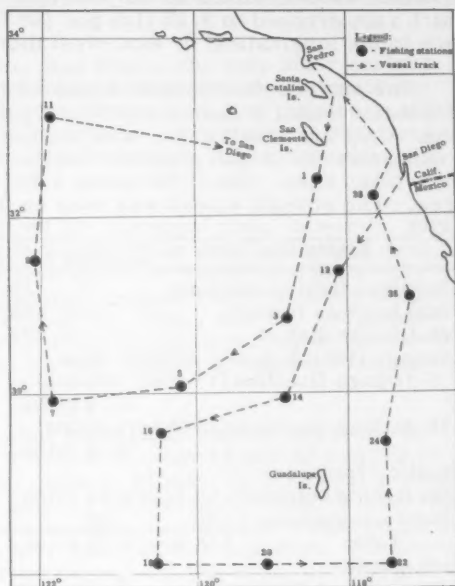
Operational studies at varying flows will be conducted by the California's Department and the Service to determine the best flows at various times of the year.

In addition to working closely with the Federal Government on the Trinity Project, the Department of Fish and Game is making recommendations concerning the proposed San Francisco Bay Barrier, Feather River Project, Coyote Dam on the Russian River, and many other lesser projects.

Public Law 732 (79th Congress) provides that on all water or power projects developed by Federal agencies, or over which there is Federal jurisdiction, state fish and game agencies must be consulted.

This includes privately-built power projects, which are licensed by the Federal Power Commission, according to Outdoor California (November 1955), a California Department of Fish and Game publication.

ALBACORE TUNA SEASONAL DISTRIBUTION EXPLORED IN EASTERN NORTH PACIFIC (Cruise 55-C-7): In order to aid in exploring the distribution of albacore tuna in the eastern north Pacific Ocean during the season for this fishery and making biological and limited oceanographic observations which may possibly relate to the occurrence of this species, the Scripps Institution of Oceanography provided the M/V *Paolina T.*, oceanographic equipment, and shoreside analysis of oceanographic data collected, the California Department of Fish and Game provided fishing gear and two biologists, and the South Pacific Fishery Investigations of the U. S. Fish and Wildlife Service provided plankton equipment and shoreside analysis of samples. The cruise (August 3-August 26, 1955) of the *Paolina T.* occurred simultaneously with NORPAC's oceanographic survey of the entire north Pacific Ocean and with the U. S. Fish and Wildlife Service Pacific Oceanic Fishery Investigations vessel *John R. Manning's* explorations for albacore tuna in an area to the north, northwest, and west of the *Paolina T.*



M/V *Paolina T.* Cruise (55-C-7), Aug. 3-26, 1955.

The following is a typical day's operation when running station lines. Forty baskets of long-line gear were set from 0600 to 0730 hours. While the gear soaked, 4 artificial lures were trolled 4 to 5 hours in the immediate vicinity of the long-line set and a standard 200-meter oblique plankton tow was made near the center buoy at 1100 hours. Retrieving of the long-line started at 1230 hours and on completion, usually 3 hours, the course was set for the next fishing station, approximately 96 miles away. En route to the next station, during daylight hours, 4 lines were trolled and a watch kept for signs of surface schools of fish and bird flocks. At night, usually commencing at 2100 hours, a plankton tow was made followed by one hour of fishing with a fine-meshed dip net under a 750-watt light.

Bathythermograph casts, to 900 feet, were made at each end of a long-line set, while occupying a night-light station and at such intervals while under way as time permitted. The thermograph was operated continuously throughout the cruise.

At each fishing station three depths were fished. The surface was sampled by trolling artificial lures of various types. Two subsurface depths were fished by rigging 20 baskets of long line with five-fathom float lines and 20 baskets with 15-fathom float lines. Fresh-frozen sardines, 3 and 4 to the pound, were used as bait. Chemical sounding tubes were used to determine the fishing depth of each section of long line. In general, the gear was set slack with the vessel traveling at its slowest speed. In several instances, however, the gear was set taut in an attempt to place the hooks through the known shallow thermocline.

The plankton tows consisted of the standard oblique tow, a net with a one-meter opening and No. 30 bolting silk bag. In order to sample from a depth of 140 meters to the surface, 200 meters of cable was paid out.

The long lines, fishing below the surface, caught albacore at every station within the survey area except at stations 18 and 20 (see chart), located at lat. 28° 04' N.,

long. $120^{\circ}40'$ W. and lat. $28^{\circ}09'$ N., long. $117^{\circ}22'$ W., respectively. The overall catch rate was 2.8 albacore per 100 hooks. These subsurface fish appeared to be concentrated, 9.5 albacore per 100 hooks, in a narrow band of water bounded by latitudes 31° and 32° N. and extending westward from the coast to 122° W. longitude (the western limits of the survey). To the north and south of this area the catch rate dropped to 3.22 fish per 100 hooks and less. There was no apparent pattern to the longitudinal or east-west distribution of subsurface albacore.

The surface distribution of albacore, as revealed by trolling and the occurrence of visual schools, presents a different picture from that of the subsurface distribution. Only one small area, near station 26 at lat. $31^{\circ}00'$ N., long. $117^{\circ}07'$ W., did a concentration of fish manifest itself. Over half of all the troll-caught albacore were taken here. Six of the seven schools of albacore sighted were also seen in this area. The seventh school was seen on the adjoining station (No. 28) to the north.

Statistical Data on <u>Paolina T</u> Cruise (55-C-7), August 3-26, 1955			
Long-line fishing stations	-	15	Fish catch (Contd.):
Total baskets fished	-	593	Long line:
Total hooks fished	-	6,274	177 albacore
Average fishing depth--middle hook			1 broadbill
5-fathom floatline (17 observations) -			1 black striped marlin
70.8 faths.			1 opah
15-fathom floatline (14 observations) -			1 dolphin fish
76.8 faths.			141 blue sharks
Trolling time:			4 bonito sharks
On fishing stations - 55 hours 25 mins.			2 pelagic rays
Between stations - 60 " 30 "			Surface schools of albacore sighted: - 7
Total - 115 hours 55 mins.			General area: $29^{\circ}33'$ N., $117^{\circ}20'$ W. to
Fish catch:			$32^{\circ}28'$ N., $117^{\circ}49'$ W.
Trolling, on stations		8 albacore	
" , between stations		14 "	

The only apparent relationship between the long-line catch and the troll catch occurred in the area encompassed by stations 24, 26, and 28 between latitudes $29^{\circ}30'$ N. to $32^{\circ}30'$ N. along longitude 117° W. Within this group of three adjoining fishing stations the long-line catch dropped as the number of surface fish increased. However, it is well to note that this same relationship did not manifest itself on the four other occasions where surface fish were taken.

The length frequencies of the long line-caught albacore indicate that there were two principal groups with modes at 64 cm. (25 inches) and 81 cm. (31.9 inches). The bulk of the fish were grouped about the smallest mode which contained 16.6 percent of the total, while the largest mode had only 4.0 percent. The troll-caught fish were 40 percent one-size group with a mode at 64 cm. (25 inches). It appears from the above, plus other data from the long-line catches, that the larger fish were well below the surface while the smaller fish were dispersed vertically.

A fair portion of the long line-caught albacore were sufficiently strong on capture to warrant tagging. This suggests that the fish were caught as the line was being retrieved, either at the surface or at some other depth. The small percentage of troll-caught fish (surface) and the general absence of visual schools is a strong indication, however, that the long line-caught fish were taken at depths other than the surface layers.

All albacore in good condition were tagged with type G white spaghetti tags. Of the 93 released, 17 were caught by trolling and 76 by long lines. On 38 fish, the tag was attached in a new position, approximately $\frac{1}{2}$ inch below the insertion of the second dorsal fin. On the other 55 fish, the tag was positioned in the customary place, below the posterior end of the second dorsal fin or under the first finlet.

Unfavorable weather conditions and mechanical difficulties on August 12 caused a major change in the original cruise plan. This involved abandoning the area due west of the commercial fishing grounds, a section of water bounded by latitudes 30° N. and 34° N. and longitudes 124° W. and 134° W. and exploring instead the southern portion of the fishing grounds, latitudes 30° N. south to lat. 28° N. and between long. 121° W. and 116° W.

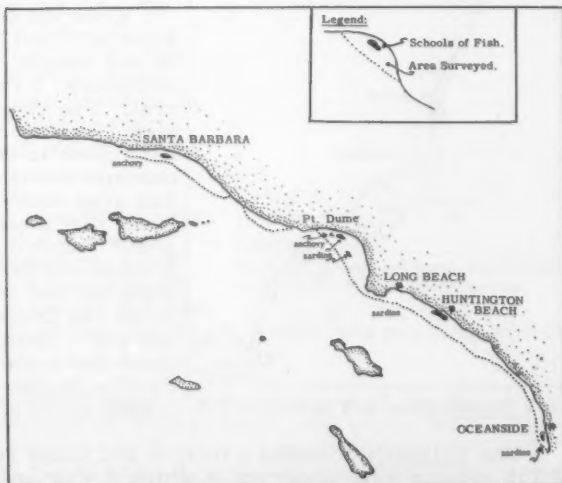
On August 14, a few miles off Point Loma, San Diego, the only other surface schools of fish were seen. By their size and behavior these fish were tentatively identified as anchovies or small sardines. Several large groups of porpoise, 35 to 50 individuals per group, were actively preying on them. It was also in this area that the only large concentrations of birds (shearwaters) were seen; they were not feeding on the surfacing schools of fish.

Blackfooted albatross were found throughout the surveyed area, however, they were not very abundant. On only one or two occasions were five individuals seen together. Generally 1 or 2 birds were to be seen about the vessel and quite frequently none. Two least petrels, *Haloccypterus microsoma*, were released with bands; one on August 13 at 32° 11' N. lat., 119° 26' W. long., and one on August 16 at 30° 45' N. lat., 118° 41' W. long. Petrels could be heard calling at almost every night-light station and while en route to the next station at night but during the day only an occasional bird was seen.

Sauries (*Cololabis saira*) were found at each night-light station; however, in general these fish were not very numerous. The sizes ranged from 12 mm. (0.47 in.) to 259 mm. (10.2 in.), with the principal mode at 33 mm. (1.3 inches). Fish 100 mm. (3.9 in.) and over were relatively scarce; they were collected at only two stations, observed on three or four others and never more than 3 or 4 individuals at a time. Several species of lanternfish were also taken quite frequently. Tunicates, primarily *Pyrosoma* sp., were fairly numerous throughout the area, not only under the light but also in the plankton tows.

AIRPLANE AND VESSEL STUDY SAMPLING AND MEASUREMENT OF FISH SCHOOLS (Airplane-Spotting Flight 55-13): In order to explore the possibilities and limitations of airplane-boat sampling and measurement of schools of fish, the California Department of Fish and Game conducted a series of tests with an airplane and the research vessel *Yellowfin* working together. It was found that the airplane and a small skiff working together and using two-way radio equipment could determine the length, width, depth, and species composition of the schools. Flights of the Department's *Beechcraft* 4758 N. took place four hours daily from November 15-16, 1955, over the inshore area from Santa Barbara to Oceanside.

Fish Behavior and Distribution: As during the same month in 1954, most of the adult sardine schools were "night" fish and



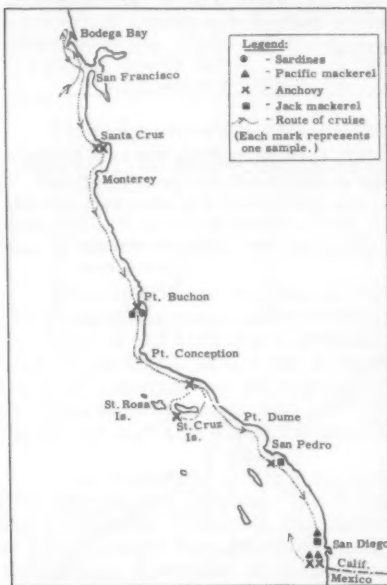
Beechcraft Flight 55-13, Nov. 15-16, 1955.

did not appear in large numbers during the daylight hours. Three small groups of sardines were sighted off Santa Monica, Huntington Beach, and Oceanside. The schools observed were small (less than 50 tons each) and were very wild. The large sardine schools off of Pt. Dume and Oceanside upon which the commercial fleet was operating at night were not visible. The migration distribution of the sardines was comparable to the November distribution of the previous season.

Research: The small school group of sardines off Huntington Beach presented an excellent opportunity for experimentation as these schools were very wild and represented the most difficult type of schools to measure and sample. A portable Bendix depth recorder was installed in the skiff so that the depth of the schools could be determined. Jig lines made up of bare silver single and treble hooks attached to monofilament line were used to obtain samples.

Attempts to cross over schools were not successful with the Yellowfin as the fish would shy away from the boat. The skiff was maneuverable and the aerial observer was able to direct the skiff over any of the schools. A sample of adult sardines was collected with jig lines while the skiff drifted over a school of fish. Estimation of the surface area of the schools could be determined by the aerial observer as the skiff passed over the school.

"YELLOWFIN" COMPLETES FINAL 1955 CRUISE TO ASSESS ABUNDANCE OF SARDINES, MACKEREL, AND ANCHOVY (Cruise 55-Y-9): The final 1955 cruise (November 3-22) covered the most northerly sector of the coast between Bodega Bay and San Diego. In addition to studies of the relative abundance of sardines, Pacific mackerel, jack mackerel, and anchovies, the California Department of Fish and Game's vessel Yellowfin resurveyed the area south of Point Conception and attempted to sample schools of fish close to where the commercial fleet was operating. During daylight hours (November 15-16) the Yellowfin worked in conjunction with a State-owned airplane in survey and sampling work.



M/V Yellowfin (Cruise 55-Y-9), Nov. 3-22, 1955.

Over the entire area worked, 69 light stations were occupied and sets with the blanket net yielded one sample of adult sardines, 8 of northern anchovies, 3 Pacific mackerel, and 3 jack mackerel. The single sardine sample obtained consisted of large fish (9.5-11 in. total length) taken very close to shore at Port San Luis (Avila). No concentrations of fish schools were seen around this area north of Pt. Conception and it seems likely that these sardines represented only "stragglers" which moved inshore from the spawning grounds earlier in the season. Anchovies were observed and sampled from Monterey Bay south to the San Diego area. Jack mackerel, though taken in a sample as far north as Avila, were much more abundant south of Point Conception. Pacific mackerel appeared to be concentrated mainly south of the Los Angeles area.

The Yellowfin traveled a total of 500 miles scouting for fish schools. A total of 135 schools were observed of which it was estimated that 37 were composed of sardines, 38 northern anchovies, 2 jack mackerel, 3 Pacific mackerel, 33 sauries, and 22 which were unidentified. The sampling activities south of Pt. Conception

were greatly hampered by adverse weather conditions. This was particularly true in the areas where the concentrations of sardines were judged to be the highest (Port Hueneme-Pt. Dume and Newport Beach to Oceanside). Surface temperatures, bathythermograph casts, and reversing-thermometer casts were taken at all possible stations. Surface temperatures ranged from a minimum of 10.4°C . (50.7°F .) at Half Moon Bay, to a maximum of 16.3°C . (61.3°F .) at Santa Barbara.

Experimental daytime work was conducted in the Newport Beach area using the State airplane, the Yellowfin, and a whale boat. This area contained numerous small schools of sardines and by means of radio communication the plane was able to direct the vessels over the schools. Preliminary attempts at sampling these fish proved successful, and although much experimental work must be done, we are hopeful that future survey work can be considerably expedited by an increased use of aerial observation.

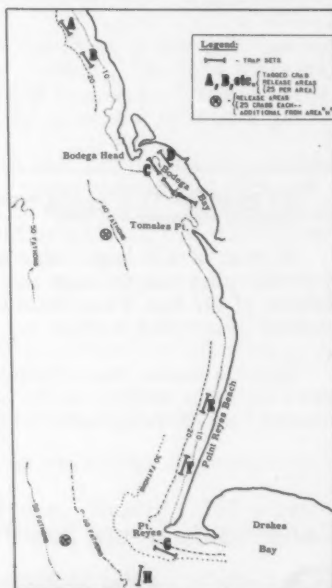
MARKET CRAB ABUNDANCE UNDER STUDY: "Robert Croll" and "Donna"
(Cruise 55-C-8): The services of the two commercial fishing vessels Robert Croll and Donna were made available to California's Department of Fish and Game (1) to determine the abundance and condition of the market crab (Cancer magister), (2) to conduct escape-opening tests, (3) to tag 300 legal-size male crabs, and (4) to sample female crabs for fertility studies. The cruise (October 22-November 2, 1955) was conducted along the central California coast between the mouth of the Russian River and Point Reyes in depths of 5-36 fathoms.

A total of 60 traps were used to make 160 sets in crab fishing areas off Duncan's Landing, Bodega Head, and Pt. Reyes. A total of 138 of the 159 sets (one trap lost) were sampled at random.

A total of 2,367 market crabs were caught in the 138 sampled traps. Of these 1,580 (67 percent) were legal 7-inch males and 786 (33 percent) were sublegal size. Only 6 females were caught. The percentage of legal per trap ranged from 52 percent at Outer Bodega Bay to 90 percent off Pt. Reyes. Three percent of the legal-size crabs and 20 percent of the sublegals were soft. Seven-inch crabs in the Outer Bodega Bay area ranged from 2-11 percent soft. In area "H" off Pt. Reyes only one percent of the legal per trap were soft.

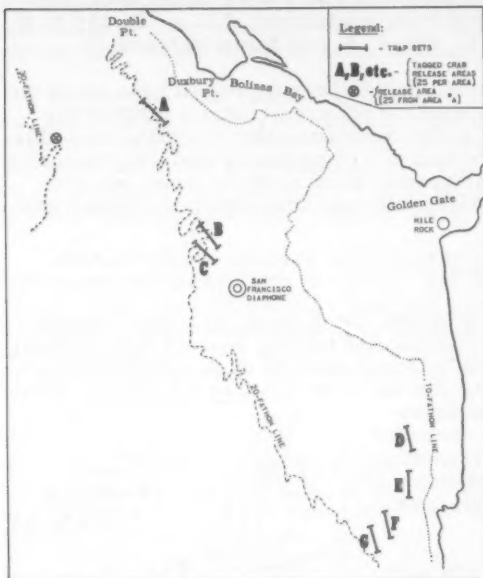
Circular escape openings of $4\frac{1}{4}$ " inside diameter were on 64 traps. An average of 10.2 legal per trap were caught with $4\frac{1}{4}$ " escape openings as compared to an average of 9.8 legal per trap without escape openings. There was an average of 4.2 sublegals per trap with escape openings as compared to 8.0 sublegals per trap with no provision for escapement.

A total of 300 legal-size crabs were tagged--50 were tagged off the Russian River area, 125 in Outer Bodega Bay and off Bodega Head, and 125 in the Pt. Reyes area. Plastic Petersen disk tags were used. Tags were placed on the carapace near the outermost spine. A nickel pin was run through the carapace, holding one disk on top and another on the underside of the carapace.



M/V Robert Croll and Donna market crab Cruise (55-C-8), Oct. 22-Nov. 2, 1955.

"Josephine" and "J. F. Pomilia" (Cruise 55-C-9): Two other commercial fishing vessels donated their services to California's Department of Fish and Game to determine (1) the abundance and condition of the market crab (*Cancer magister*), (2) to tag 300 legal-sized male crabs, and (3) to sample female crabs for fertility. The area covered by the cruise of these vessels was extended along the coast of California from Double Point in the north to Point San Pedro in the south.



M/V Josephine and J. F. Pomilia market crab Cruise (55-C-9), November 3-9, 1955.

During the cruise (November 3-9, 1955), a total of 71 crab traps were used to make 142 sets; 73 sets were sampled at random. Sets were made off Double Point, San Francisco Lightship, and Pt. San Pedro in depths of 13 to 30 fathoms.

A total of 2,595 market crabs were caught in the 73 sampled traps. Of these, 2,077 (76 percent) were legal 7-inch males and 509 (24 percent) were sublegal. Only 9 females were caught. The percentage of legal-size crabs per trap ranged from 67 percent in the San Francisco Lightship area to 90 percent off Pt. San Pedro. Six percent of the legal-size crabs and 42 percent of the sublegals were soft. Seven-inch crabs ranged from 10 percent soft in the Double Point area to 2 percent in the Pt. San Pedro area.

A total of 250 legal-size male crabs were tagged with Petersen disks attached by nickle pins run through the carapaces--50 were tagged off Double Point; 50 in the vicinity of the San Francisco Lightship; and 150 in the Pt. San Pedro area. Rough weather precluded further tagging operations after November 9, 1955.

Spermathecae were removed from all females captured on all crab cruises for future fertility studies at the Stanford laboratory. It was noted that several of the females had recently entered the egg-bearing stage.



Cans--Shipments for Fishery Products, January-November 1955



Total shipments of metal cans for fish and sea food during January-November 1955 amounted to 97,599 short tons of steel (based on the amount of steel consumed in the manufacture of cans), compared to 102,533 short tons for the same period last year.

The packs of canned tuna, Maine sardines, and salmon in 1955 were all lower than in 1954.

Note: Statistics cover all commercial and captive plants known to be producing metal cans. Reported in base boxes of steel consumed in the manufacture of cans, the data for fishery products are converted to tons of steel by using the factor: 23.0 base boxes of steel equal one short ton of steel.



Federal Aid Programs Help Restoration

On a thousand fronts, in every section of the country, fish and game specialists are fighting the fight to keep America's fish and wildlife resources apace with or ahead of the ever-increasing demand.

The huge conservation program which is being carried on aggressively by each of the 48 states and the Territories is bolstered by a Federal aid program which during the last fiscal year made nearly \$16 million available to the states, Acting Secretary of the Interior Clarence A. Davis announced December 16.

The money is used on state projects which have promise of fish and game restoration and are approved by the Fish and Wildlife Service. These projects may be of a physical nature--acquisition of land and waters, development of fishing lakes, feeding and breeding areas or sanctuaries; or they may be research efforts designed to increase the fish and game supply by solving the many problems for which the specialists have no answer.

The objective of the Federal aid program--the restoration of fish and wildlife--is further buttressed by vigorous, effective, and varied projects conducted with state funds, and by the farflung refuge, research, and hatchery program of the Fish and Wildlife Service.

"The need for this continuous, all-out effort at restoration of our fish and wildlife resources is substantiated by cold statistics," Davis said. "In 1954 there were 18.5 million persons in this country holding state fishing licenses. This is twice the number held ten years ago and it is increasing at the rate of a million a year.

"Add to this the fact that our increasing population and our increasing need for homes and for farm and industrial lands and for more water means that fish and game habitats are shrinking faster than new ones can be developed. Then an idea of just what kind of task lies ahead for those who would perpetuate our wildlife resources is apparent."

Some of the accomplishments in fish restoration were:

Forty-three states engaged in one or more vitally important fact-finding projects.

Thirteen states eliminated undesirable fish from a total of 36 lakes.

Six states had projects for stream development and watershed improvement.

Sixteen states purchased land for public fishing areas. Nearly 2,700 acres were purchased and an additional 56,000 acres were leased for fishery projects.

Seventeen states and Alaska constructed access roads to fishing areas.

Considerable knowledge was gained by research on poisoning of a lake or stream to rid waters of trash fish without unduly harming sport fish.

Studies were in progress on ways and means of making reservoirs more productive and better able to fill the need for more public fishing waters.

Marine fish and fishing came under the scrutiny of biologists in 12 of the coastal states. Studies varied from survival of ocean salmon in California to Atlantic salmon migration in Maine.



Federal Purchases of Fishery Products

FRESH AND FROZEN FISHERY PRODUCTS PURCHASES BY THE DEPARTMENT OF DEFENSE, OCTOBER 1955: For the use of the U. S. Army, Navy, Marine Corps, and Air Force, the Army Quartermaster Corps during October 1955 purchased 2.0 million pounds (valued at \$0.9 million) of fresh and frozen fishery

Purchases of Fresh and Frozen Fishery Products by Department of Defense (October and the First Ten Months of 1955 and 1954)							
QUANTITY				VALUE			
October	Jan. -Oct.	October	Jan. -Oct.	October	Jan. -Oct.	October	Jan. -Oct.
1955	1954	1955	1954	1955	1954	1955	1954
. (Millions of Pounds) .				. (Millions of Dollars) .			
2.0	2.0	21.3	21.0	0.9	0.9	9.2	8.6

products. This was an increase of 11.0 percent in quantity and 6.1 percent in value as compared to September purchases. October 1955 purchases were higher by 0.9 percent in quantity and 1.8 percent in value, than purchases for October 1954.

Purchases of fresh and frozen fish for the first ten months in 1955 totaled 21.3 million pounds (value \$9.2 million)--higher by 1.4 percent in quantity and 6.1 percent in value as compared with the first ten months of 1954.

Prices paid for these fishery products by the Department of Defense in October averaged 43.9 cents as compared with 45.9 cents in September 1955 and 43.5 cents in October 1954.



Great Lakes Fishery Investigations

"CISCO" RETURNS FROM SURVEY TRIP OF NORTHERN LAKE MICHIGAN (Cruise XI): Weather conditions during the cruise (November 1-12) of the Great Lakes Fishery Investigations research vessel Cisco were extremely unfavorable. Rough seas were prevalent during practically the entire cruise so that some of the scheduled operations could not be completed. The cruise was the fourth in a series covering the same general areas of northern Lake Michigan.

Experimental nylon gill nets were set at 25, 50, 80, and 135 fathoms off Frankfort, Mich., and at 25 and 50 fathoms off Sturgeon Bay, Wis. Bloaters (Leucichthys hoyi) predominated in the 25- and 50-fathom sets on both sides of the lake. The catches at both depths were heavier on the east side of the lake. Leucichthys kiwi was the most abundant species in the 80-fathom sets, and was practically the only species in a very large catch at 135 fathoms. Most of the L. kiwi taken in the deeper set were of a small-medium size and were caught in the smaller mesh sizes (2 and 2½ inch, stretched measure). Many L. kiwi were spawning and ripe specimens were taken at all depths fished. Three of the scarce blackfin (L. nigripinnis) were caught in the sets off Frankfort and three alewives (Pomolobus pseudo-harengus) were taken off Sturgeon Bay.

Hydrographic transects were made across northern Lake Michigan from Frankfort to Sturgeon Bay and from Manitowoc, Wis., to Ludington, Mich. Three hydrographic stations were visited along each transect. Bathythermograph casts were made at 5-mile intervals and drift bottles were released at several points along the transects.

Thermal stratification is present in northern Lake Michigan only in the very deep water. Surface waters, which ranged in temperature from 4.6° C. (40.3° F.) to 10.7° C. (51.3° F.), were generally somewhat warmer on the east side of the lake than on the west side.

Night midwater trawling operations were carried out at 25 fathoms where the water was homothermous from top to bottom. Very little was caught. It appears that chubs do not become concentrated at midlevels except in connection with a sharp thermocline.



Maine

CANNED MAINE SARDINE, CONSUMER-ACCEPTANCE TESTS: A nationwide program of consumer-acceptance tests covering the various packs of Maine sardines will be launched early in 1956, according to news releases from the Maine Sardine Industry. The Executive Secretary of the group said on December 24, 1955, that more than 4,200 families in 12 cities will be personally interviewed for what is considered to be an adequate cross-section of the country's population.

From the tests, the Maine Sardine Industry hopes to obtain valuable information on the consumer side of the sardine market which will assist the packers in planning for the future.

Families will be asked to state their preferences for the different packs after actually tasting and examining samples which will be opened for them by the interviewer.

Eight different processes will be tested, including conventional, baked, fried, mustard, tomato, raw pack, can-cooked, and Belgium cooker.



Maryland

1955/56 OYSTER SEASON GOOD: With the advent of cooler weather in the fall of 1955, sales of oysters were brisk and prices on the Chesapeake were high for the season. A short supply in the more northern states and heavy losses that occurred in some parts of Virginia in the summer of 1955 greatly augmented the demand for local oysters. Large fleets of tongs were busily engaged in harvesting the 1955/56 crop and were making exceptionally high earnings in some areas where supplies are abundant. Favorable weather was a substantial factor in favoring good catches, states the December 1955 Maryland Tidewater News.

As a rule early September 1955 catches contained relatively few "fat" oysters. Oysters consume much stored food during spawning in summer. The organisms upon which they feed are less abundant in warm water and oysters also suffer from the ills to which they are prey. The result then is that oysters typically are in their poorest condition at the end of the summer. With the coming of fall weather the surface waters, which produce the tiny microscopic plants upon which oysters feed, become heavier as they cool off. These heavier surface waters then sink and displace the warmer bottom water with its summer-long accumulation of rich fertilizing ingredients that have resulted from decomposition of aquatic organisms. The enriched water, now brought to the surface where sunlight can stimulate plant growth, quickly produces an abundance of the tiny plants needed to make oysters fat and tasty. The heavy rains from the summer hurricanes, destructive, though they were in some areas, contributed further to the waters' richness. The result was that oysters fattened rapidly and towards the latter part of 1955 were in top condition in most areas. It is significant that fattening takes place earlier on up-river and up-bay bars where the water cools more rapidly and where the nutrients brought in by streamflow first reach oyster-producing waters.

UNDERWATER BREATHING APPARATUS USEFUL TO BIOLOGISTS: The biologists at the Chesapeake Biological Laboratory at Solomons have made good use of a relatively new tool in aquatic research in recent months--a self-contained underwater breathing apparatus or SCUBA. This equipment, such as the "Aqualung," the "Northill," and the "Scott Hydropak," opens up new vistas for research on aquatic life. For example, it is one thing to study the life history of oysters, clams, and other bottom forms from samples brought to the surface; it is quite another thing to be able to study these forms undisturbed in their natural environment. The diurnal migrations of aquatic forms, their spawning behavior, and the efficiency of various types of nets and collecting gear in sampling the species that are present, all can be studied to very great advantage by a biologist equipped with SCUBA.

SCUBA has been used to observe the operation of a small experimental trawl used in collecting specimens of aquatic organisms, according to the November 1955 Maryland Tidewater News of the Maryland Department of Research and Education. There had been some doubt as to how well this trawl had been fishing, what the width of its path across the bottom was and how the floats kept the mouth of the net. A biologist wearing the Northill apparatus was towed behind the boat pulling the trawl in 15-20 feet of water during mid-September 1955. It was observed from close quarters that the trawl doors kept the net well extended and that the floats were sufficient to keep the headline up. The net ballooned out behind with the cod end floating off the bottom and the trawl doors slid along on their metal-clad lower edges. At higher speeds there was a tendency for the whole net to lift off the bottom but notes were made on the highest possible speed consistent with the net skimming on the sand. Fish were scarce, but many blue crabs were observed to swim ahead as the net disturbed them until they were finally engulfed.

The apparatus is also being used in the collection of toadfish used in a cooperative study to shed new light on the causes of diabetes. In a rotenone project, SCUBA was used to ascertain what proportion of the suffocated fish sank to the bottom. Divers from the Department of Research and Education and the Chesapeake Bay Institute swam along survey lines laid across the bottom of a cove collecting all fish which had sunk along these predetermined paths. This contributed greatly to the accuracy of the estimate of the fish population. Research on the soft-shell clam (*manninose*), *Mya arenaria*, will be greatly facilitated by the use of this equipment allowing a biologist to observe the clam areas underwater. In clamming areas in other states the tides uncover clam flats and experimental work and observations can be carried out at that time. Since the clam flats are almost always covered in tidewater, SCUBA may be the answer to work with soft-shell clams in their natural environment in Maryland.



National Canned Salmon Week

A nationwide canned salmon publicity campaign--"National Canned Salmon Week"--will be featured again this year. The Pacific Coast Canned Salmon Brokers selected February 12-22, 1956, as the dates for this year's "Canned Salmon Week."

Trade publications, daily and weekly newspapers, radio, television, and other effective media will be used to publicize and popularize canned salmon. Some firms will join in with brand advertising.

Publicity will emphasize the economical nutritious food value of canned salmon as a concentrated, cooked, vitamin-rich protein food, "ready to eat right out of the can," or served in salads or hot dishes.

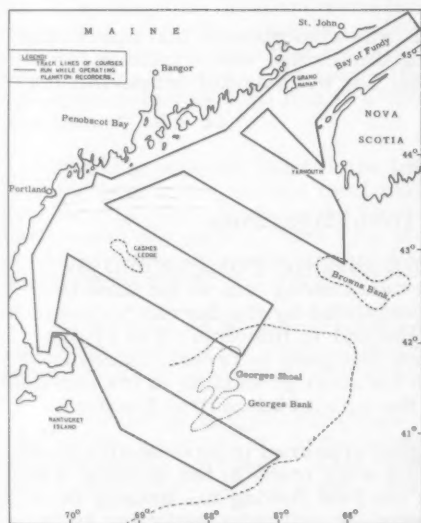
Special canned salmon menus for display on dining cars will be printed by the Great Northern Railway to observe the week, calling attention to salmon, the great natural resource of Alaska, Puget Sound, and Columbia River areas.

Union Pacific, Southern Pacific, Pennsylvania Railroad, the New York Central System, and the Wabash Railroad Company are still other rail-dining services which will feature canned salmon dishes during the special week and throughout Lent.

State restaurant associations will serve as important distribution mediums for material on canned salmon quantity recipes and "Silver from the Sea" menu clip-ons. Plans for such distribution were completed with restaurant associations of Tennessee, West Virginia, Iowa, Wisconsin, Arkansas, Kansas, Louisiana, Alabama, New York, and North Carolina.



North Atlantic Herring Research



Young herring sought on Cruise 8 of the Service's research vessel Theodore N. Gill.

herring) as they are drawn through the water, collecting it on a moving strip of graduated silk gauze, and winding it onto a spool. These spools of gauze are returned to the laboratory for analysis.

The cruise was originally planned for the period of November 7 to 17, but due to time lost because of adverse weather, an additional trip from November 28 to December 3 was required in order to finish the outlined work.

Temperature records were made of the surface water with a recording thermometer and of the subsurface water with a bathythermograph.

"THEODORE N. GILL" SEARCHES FOR YOUNG HERRING (Cruise 8): In order to capture young herring or larvae and to obtain some measure of their abundance in the Gulf of Maine, a plankton survey of the Gulf of Maine, Georges Bank, and the Bay of Fundy was made in November and December 1955 by the Service's research vessel Theodore N. Gill (Cruise 8, November 7-17, 1955, and November 28-December 3, 1955).

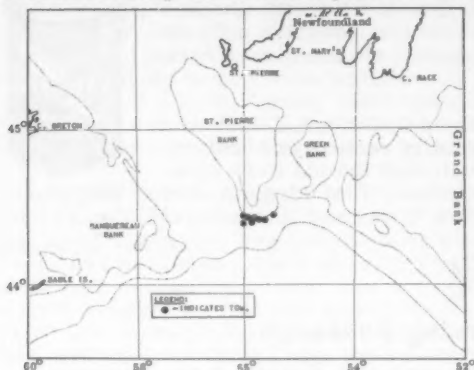
This work is being done in an effort designed to learn (1) where herring larvae are produced, (2) the degree of success of this year's spawning, (3) the degree of survival, (4) factors influencing survival, and (5) the patterns of drift of the larvae.

Plankton was collected with a one-meter silk net and with "Hardy" continuous plankton recorders. Two of these recorders were operated while running full speed (approximately 9 knots) along a predetermined course. One machine was towed at the water's surface and one at the 10-meter depth. These recorders strain out a sample of plankton (including young



North Atlantic Fisheries Exploration and Gear Research

DEEP-WATER OCEAN PERCH FISHED BY "DELAWARE" (Cruise 12B): A search for deep-water ocean perch was the principal mission of this cruise (November 30-December 15, 1955) of the Service's exploratory fishing vessel Delaware. Operating south of St. Pierre Bank, the largest catch of the cruise consisted of 2,000 pounds of medium-size ocean perch taken at 225 fathoms.



Area explored by the Service's exploratory vessel Delaware for deep-water ocean perch (Cruise 12B).

water trawling at the western edge of Grand Bank, but weather did not permit the carrying out of this objective.

The vessel's explorations of fishery resources in deep water at the edge of the Continental Shelf were extended eastward by this cruise. However, storms permitted only eight one-hour drags with the otter-trawl gear. During one particularly violent storm, winds attained a velocity of 75 miles an hour, with gusts up to 100 miles an hour.

It was also planned that operations during this cruise would include deep-

Pacific Oceanic Fishery Investigations

YELLOWFIN TUNA FISHING TRIP OFF LINE ISLANDS COMPLETED BY "JOHN R. MANNING" (Cruise 27): A five-week tuna fishing trip to the Line Islands, about 1,000 miles south of Hawaii, was completed by the Service's research vessel John R. Manning on October 29 when it returned to Honolulu. The cruise was part of a year-round program of observations designed to reveal the seasonal fluctuations in the abundance of yellowfin tuna in the most promising of the tuna fishing grounds discovered by Service scientists in the equatorial central Pacific.

The center of yellowfin abundance in the region appeared to have shifted slightly to the northward, and the best long-line catches were made in the vicinity of Palmyra Island instead of Christmas Island, where the best fishing has usually been found on previous cruises. Surface schools of smaller yellowfin (weighing 30 to 50 pounds each) accompanied by flocks of birds were very abundant around Washington Island, but the schools were wild and tended to disperse when the vessel approached, which made it difficult to fish them effectively by trolling.

A considerable number of small yellowfin were taken on the trolling lines, however, and most of them were successfully tagged and released alive. The tagging done on this cruise brings to a total of more than 900 the number of yellowfin tuna marked and released by POFI scientists in the Line Islands region. It is anticipated that recaptures of these tagged fish, either by Hawaii-based vessels in the central Pacific, by Japanese fishermen in the equatorial western Pacific, or by the California tuna fleet in the eastern Pacific, may reveal important information on the migrations and growth of this commercially-valuable species.

Frequent observations of surface and subsurface water temperatures were made during the cruise. A permanent temperature-recording device which had been installed off Christmas Island on another recent POFI cruise was serviced. The data

so obtained will be analyzed for evidence of shifts in currents and water masses that may be related to changes in the abundance of tuna on the equatorial fishing grounds.

SEASONAL TUNA ABUNDANCE IN LINE ISLANDS STUDIED BY "JOHN R. MANNING" (Cruise 28): Long-lining and trolling for yellowfin tuna around the islands of Christmas, Fanning, Washington, and Palmyra in the Line Islands group (about 1,000 miles south of Hawaii) was the purpose of the one month's cruise by the Service's research vessel John R. Manning, which returned to Pearl Harbor on December 17. This experimental fishing was part of a year-round program to chart the seasonal and longer-term fluctuations in tuna abundance in an area pioneered as a tuna-fishing ground by U. S. Fish and Wildlife Service vessels. Although valuable data were collected and 40 yellowfin tuna were successfully tagged and released, the level of abundance encountered on this cruise was unusually low by comparison with past cruises. At the best long-line station, northwest of Christmas Island, the tuna catch rate was only 1.5 fish per 100 hooks, while the waters off Palmyra Island, where the best trolling was found, produced only slightly over 2 tuna per hour of fishing.

Five long-line stations were fished, 3 of 60 and 2 of 99, 11-hook baskets. The remaining scheduled stations could not be fished because of line-hauler breakdowns. Catches at the stations that were made, from south of Christmas Island to the vicinity of Fanning Island, indicated a low level of abundance of yellowfin tuna. The average catch rate was 0.53 fish per 100 hooks, with a maximum, northwest of Christmas Island, of 1.55.

Trolling with six lines in the immediate vicinity of the islands was only slightly more productive, with a total yellowfin catch of 64 for 108 hours of fishing. The best catches were made on the first 2 days off Palmyra, when the taking of 18 yellowfin each day gave a catch rate of slightly more than 2 fish per hour. Trolling produced the usual incidental catches of wahoo, the day's record being 53 taken at Washington Island.

Of the total of 80 unutilized yellowfin taken by both methods, 40 were tagged and released alive for study of their growth and migrations. The remaining 40 were examined as to food habits and sexual maturity.

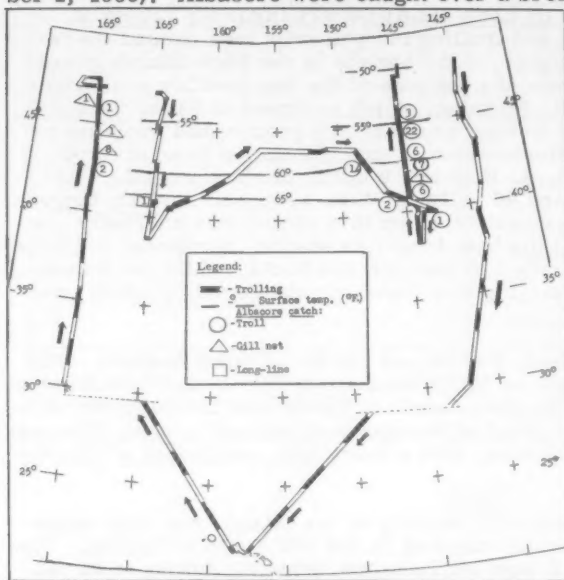
A section of bathythermograph casts at frequent intervals was made down 156° 30' W. from 10° N. to the equator. A series of three 10-mile BT. sections was completed northwest, west, and southwest out of the London anchorage at Christmas Island with casts at 1-mile intervals.

Fishing was attempted on a commercial scale by setting 100 baskets of tuna long-line gear out of a revolving tub in which the main line is flaked down continuously instead of being disassembled into 11-hook units as it is hauled. Despite minor defects, the tub proved highly successful on the haul and lightened the fishermen's labor considerably. The 1,003-1,042 hooks fished on two stations compares well with the average of 1,500 fished by Japanese long-liners employing 3 times as many fishermen as the John R. Manning.

Five night-light stations were made at various anchorages and in the open sea; records were made of sightings of tuna schools and other biological phenomena; stomachs of the 4 skipjack captured were preserved; records of meteorological and hydrological observations by resident observers were picked up at Christmas and Palmyra Islands.

ALBACORE TUNA SURVEY IN NORTH PACIFIC BY "CHARLES H. GILBERT"
(Cruise 23): An intensive seven-week survey of the albacore tuna in the North Pacific between Hawaii and Alaska was conducted by the Pacific Oceanic Fishery Investigations research vessel Charles H. Gilbert (Cruise 23, September 15-November 2, 1955). Albacore were caught over a broad area approximately 1,200 miles

north of the Hawaiian Islands. These catches indicate that there has been a migration of the commercially-valuable white-meat tuna into this area since a similar survey in the spring, which showed an almost complete absence of the species.



Fall albacore tuna survey in North Pacific between Hawaii and Alaska by the research vessel Charles H. Gilbert (Cruise 23). For clarity the northbound leg on 165° W, and southbound leg on 145° W, have been displaced.

Albacore abundance was sampled using long lines, gill nets, and trolling lines, and all of these methods caught tuna. The long lines, fishing deep during the daytime, took the largest fish, weighing about 60 pounds each. Albacore taken in the gill nets, which were fished just below the surface and at night, were the smallest, averaging around 7 pounds each. Trolling took medium-size albacore averaging 12 pounds each, and this was the fishing method employed most, as bad weather during part of the cruise made long-lining and gill-netting difficult. Only one albacore school was observed (45° N., 145° W.).

Of the albacore brought aboard in good condition, 52 were tagged and released for study of their migrations and growth. Recent recaptures in the western and central North Pacific of albacore tagged off the California coast have already given evidence of the great range of the migrations of this species, and recoveries of the fish released by research vessels north of Hawaii would help greatly to clarify the course and seasonal schedule of these Pacific-wide wanderings.

This cruise was one of a series planned to continue through several years. The objectives of these cruises are to study the life history of the albacore in relation to the currents and water masses of the North Pacific and to determine whether or not a profitable commercial fishery for this tuna can be established in the waters north of Hawaii. This study is one of several financed under provisions of the Saltonstall-Kennedy Act.

Trolling with 3 to 8 lines took a total of 64 albacore (fig. 1). Thirteen of the 37 additional strikes were identified as albacore. The best troll catch was made on October 17 on a trolling run between 43° 52' N., 144° 48' W. and 44° 56' N., 144° 49' W. when 22 albacore were landed. Except once, no surface signs of fish were seen, e.g., logs, "working" birds, or fish breaking water. The troll-caught albacore ranged in size from 6 to 28 pounds and averaged 12 pounds.

On 165° W. longitude albacore were taken between 42° 30' N. and 46° 00' N. latitude with surface temperatures ranging from 56° to 60° F. Along 145° W. longitude albacore were taken in a wider latitudinal band extending from 40° 00' N. to

46°00' N. latitude with the surface temperatures ranging from 53° to 66° F. In addition to the albacore, 5 skipjack and 3 dolphin were taken on the trolling lines.

A total of 8 long-line stations was occupied. At each station 40 baskets of 13-hook gear were fished. Only one albacore weighing 58 pounds was taken on the long-line gear at 41°04' N., 164°29' W. The remaining catch on the long-line gear consisted of 5 big-eyed tuna, 18 *Alepisaurus* sp., 54 great blue shark, 1 mako shark, 8 dolphin, and 1 skipjack.

Gill nets were set on five occasions during the cruise. At each station six shackles (two each of 5-inch, 6-inch, and 7-inch stretched mesh gear) were set at dusk and retrieved at daybreak. Each shackle was 50 fathoms long and 100 meshes deep. A total of 11 albacore ranging in size from 6 to 21 pounds was taken by the gill nets. The highest single catch of 8 albacore was made at 43°22' N., 164°40' W. The rest of the catch by the gill nets consisted of 23 great blue sharks, 2 pomfrets, 1 cuttlefish, and 1 fur seal.

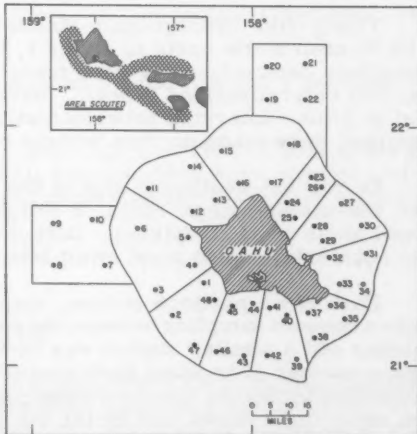
The recording thermograph was run continuously throughout the cruise. Along 165° W. longitude the most drastic change in surface temperature occurred at 42° N. latitude where a drop of 4° F. (65° to 61° F.) was recorded in 10 nautical miles. Along 145° W. the major temperature change occurred at 47° N. latitude where the surface temperature dropped 2° F. (53° to 51° F.) in less than 1 nautical mile.

The vertical temperature picture (as obtained with the bathythermograph) showed a very sharp thermocline at approximately 100 feet throughout the northern sections.

SKIPJACK TUNA-SCOUTING TRIP COMPLETED BY "CHARLES H. GILBERT"

(Cruise 24): Two days were spent scouting for skipjack tuna by the Service's research vessel Charles H. Gilbert (Cruise 24, Nov. 14-30, 1955) in each of the following areas with negative results: (1) west and north of Oahu, (2) between Oahu and Lanai, and (3) north of Molokai.

A total of 48 stations were occupied as shown on the chart. Plankton collections, with the one-meter net, were made to a depth of 200 meters (656 feet) at even-numbered stations and to just above the thermocline, which was between 200-300 feet at most stations, at odd-numbered stations.



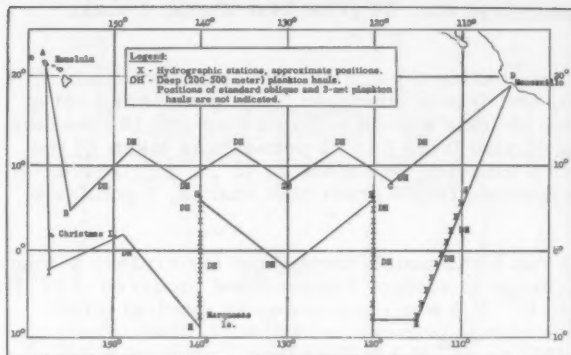
Charles H. Gilbert Cruise 24 (Nov. 14-Nov. 30, 1955).

FERTILITY OF EASTERN TROPICAL PACIFIC STUDIED BY "HUGH M. SMITH"

(Cruise 31): The study of the productivity or fertility of a vast area of the eastern tropical Pacific (Hawaii to Mexico) through observations of the ocean currents, the distribution of oxygen and nutrient chemicals in waters, the amount of plankton and other fish food, and the abundance of tuna schools was the object of the 86-day cruise of the Service's research vessel Hugh M. Smith, which returned to Honolulu on December 17, 1955. The cruise included a bait fish survey in the Marquesas Islands, and a brief stop in the Line Islands. The observations covered an area of the ocean larger than the continental United States. This cruise was part of a series

being conducted jointly by the U. S. Fish and Wildlife Service, Japan, Canada, and private scientific institutions to study the physical oceanography, biological conditions, and other scientific phenomena over wide areas of the Pacific Ocean.

Eight crossings (see chart) of the northern boundary of the counter-current boundary were accomplished on the eastbound leg with bathythermograph lowerings



at 2-hour intervals. Contrary to expectation the location of the current boundary did not show much latitudinal variation ($10^{\circ}30' N. \pm 20'$) over the 2,500 miles that it was followed. The isotherms increased in depth on both sides of the current boundary except in the eastern Pacific where the isotherms instead of dropping remained relatively constant north of the boundary. On the eastbound leg surface samples were collected twice daily for inorganic phosphate and salinity determinations.

Cruise 31, Hugh M. Smith, September 27-December 17, 1955.

Along the northern boundary of the countercurrent a total of 42 closing-net hauls sampling at 3 levels, 42 standard 200-meter oblique hauls, 8 oblique hauls between 200 and 300 meters, and 21 pelagic trawl hauls were completed during this period of the cruise. Zooplankton volumes were found to increase from west to east as far as $123^{\circ} W.$ longitude and then drop off. The trawl catches did not vary greatly with longitude.

Thirty-five hydrographic stations were completed during the westbound legs with Nansen bottle casts to either 1,200 or 1,000 meters. Oxygen and inorganic phosphate determinations were made at sea, and water samples were retained for salinity determinations ashore. Bathythermograph lowerings were made on station and at 2-hour intervals between stations. In addition surface phosphate and salinity samples were taken on runs without full hydrographic stations.

During the westbound legs of the cruise a total of 72 closing-net hauls, 80 standard 200-meter oblique hauls, 8 oblique hauls at 200-300 meters, and 33 pelagic trawl hauls were completed. Definite conclusions on the variations in abundance in the equatorial region must await laboratory analysis of the collections.

Each day a plankton station, employing closing-nets sampling at three levels and an open-net sampling between the surface and 200 meters, was occupied just before midday and a similar station was occupied just before midnight. On each day-station a number of incident light measurements were recorded and each station was concluded by Secchi disc and water color observations. Superficial examination of the collections shows that by far the largest volume of plankton was taken near the surface and that it differed in composition from that of lower levels. It was evident that about $1\frac{1}{2}$ to 2 times as much plankton was taken in the night as in the day hauls.

The 746 bathythermograph casts made during the cruise were well distributed across the area of study. As was expected, on the eastbound leg of the cruise along the northern boundary of the countercurrent, the depth to 70° decreased from west to east, from 130 feet at $156^{\circ} W.$ to 90 feet at $122^{\circ} W.$ and then deepened to 130 feet at $115^{\circ} W.$ On the westbound portion of the cruise doming in the isotherms did not always occur on the equator--sometimes it was slightly to the north, sometimes to the south. On two sections the temperature characteristics at the equator suggested an easterly flow. Surface temperature along the equator increased from 69° at $112^{\circ} W.$ to 76° at $157^{\circ} W.$

The wheel watch maintained a lookout for tuna schools and bird flocks during all daylight hours that the vessel was under way. A total of 45 schools were sighted, most of which were thought to be skipjack. The insular influence, with its greater bird life and possibly greater fish life, was clearly evident. The number of schools sighted on the eastbound leg between 140° and 120° W. longitude was definitely higher than the average for the open ocean. Surface trolling during daylight hours yielded poor results; the total catch for the cruise consisted of 13 dolphin, 5 wahoo, 2 skipjack, and 2 black skipjack.

Six days were spent in the Marquesas scouting for bait or in running between islands with a lookout for tuna schools and with the surface trolling lines out. Only 4 schools of tuna (2 skipjack and 2 unidentified) were sighted close to the islands.

A small sardine, Harengula vittata, occurs in the bays of the islands, apparently at times in marked abundance, but during the time of our survey it was scarce. With considerable effort we obtained about 130 buckets of these fish which we hoped to bring back for stocking in Hawaiian waters. The majority were lost at sea, however, during rough weather. About 20 buckets of the sardines survived the cruise and were released close-in to the leeward coast of Oahu.

At the beginning of the cruise some excellent records of the evening rise in the scattering layer were obtained with the EDO depth sounder.

With equipment provided by the University of Hawaii, the rate of carbon-14 uptake and plant pigment determinations were made either once or twice daily through the westbound portion of the cruise. The samples were filtered at sea and the millipore filters returned to the laboratory for analysis.

A prominent front with 4° F. temperature change was found at $4^{\circ}08'N.$ - $120^{\circ}32'W.$ About 15 hours were spent in the frontal area during which we made 29 bathythermograph casts, 7 surface plankton hauls with a 1-meter net, 1 pelagic trawl haul, and 2 night-light stations.

Morphometric measurements were performed on 5 yellowfin and 2 skipjack caught by surface trolling.

In addition to the regular wheel watch, a 1-hour watch at 1600-1700 hours was maintained each day throughout the cruise and all birds sighted were counted and identified as accurately as was possible. On the westbound leg a similar watch was carried out each morning at 0600-0700 hours.



South Carolina

FISHERIES BIOLOGICAL RESEARCH PROGRESS, SEPTEMBER-DECEMBER 1955: Finfish Research: The work of the Bears Bluff Laboratories fisheries research vessel gave additional information on the time and place of spawning of spot and croaker. Hitherto, during the shrimp survey (begun in December 1952) one croaker was found in spawning condition inshore in St. Helena Sound. A few were noted last winter in 5 and 6 fathoms of water about 3 and 4 miles offshore of Edisto Beach. During November and December 1955, croaker and spot in fair numbers were located some 40 to 45 miles southeast of North Edisto Inlet in 250 feet of water. Practically all these fish were in spawning condition, according to Progress Report No. 26 from Bears Bluff Laboratories at Wadmalaw Island, S. C.

Shrimp Research: In November and December the research vessel made a total of 55 experimental drags, most of which were made at night. Rock shrimp,

Sicyonia brevirostris (30 count, heads off), were taken in abundance in from 27 to 47 fathoms of water. A few large (maximum 8 inches) brown shrimp, *Penaeus aztecus*, were found in 35 to 40 fathoms. The females had attached spermatophores. The lone male had well developed spermatophores. No white shrimp were found outside the commercial fishing area. The brown shrimp were not numerous enough to be fished commercially.

Salt-Water Ponds: On November 28 and on November 29, two of the one-acre experimental ponds at Bears Bluff were drained and the fish, shrimp, and crabs harvested. These ponds had previously been drained and cleaned out on August 15, 1955. From August 23 to the end of the month, both ponds were restocked with small white shrimp, *P. setiferus*. In addition, one of the ponds--the oyster pond--was stocked with about 450 mullet, a few spot, and croaker.

November 1955 Shrimp Harvest of Ponds Stocked Latter Part of August 1955		
Item	Fish Pond	Oyster Pond
Number stocked	1,735	1,747
Weight of stocked shrimp	198.2 oz.	209.6 oz.
Number harvested	739	1/757
Weight of harvested shrimp	568.0 oz.	538.1 oz.
Mortality	57.4 percent	56.7 percent
Size increase, length	2 times	2 times
Weight increase, mass	2.86 times	2.57 times
Weight increase, individual	6.72 times	5.93 times
1/ It is possible that of these shrimp 12 were recruits. Counting these the mortality could have increased to 57.0 percent.		

Some of the mortality can be attributed to 3 or 4 Hooded Mergansers which continually lived in the ponds from the latter part of October, and to an otter which fished the ponds regularly.

In one of the ponds 10 white shrimp were tagged with Petersen disk tags; were held in cages in the pond until recovery from tagging was insured, and then released. Only one tagged specimen was recovered.

The 446 mullet stocked in the oyster pond weighed a total of 40 pounds. They were from 3 to 7.5 inches in length when stocked. The dominant size was around 4 inches. A total of 216 were recovered on draining the pond on November 28. These weighed 62 lbs. 3.5 oz. Mortality apparently was 52 percent; the increase in length from 1.6 to 2 times the original size. The total actual weight of all mullet recovered was, despite the mortality, 1.55 times that of those stocked. The individual weight increase of the mullet was 3.2 times in the three months period.



United States and Alaska Fisheries Production, 1955

The United States and Alaska 1955 catch of fish and shellfish was estimated about 4.6 billion pounds, a drop of 2 percent from the 4.7 billion pounds caught in 1954. (Catch statistics for fish and crustaceans are based on the weight as caught, while mollusks are reported as the weight of the meats.) The ex-vessel value of the 1955 catch was estimated at about 10 percent less than the \$360 million for 1954. The drop in ex-vessel value was due primarily to the sharp declines in the catches of high-priced species, especially salmon, tuna and halibut. The loss in volume (but not the value) of these varieties was compensated to a great extent by increases in the catches of lower-priced varieties such as whiting, Alaska herring, and a record catch of menhaden.

Menhaden accounted for almost 40 percent of total United States and Alaska catch, which includes nearly 200 items. Menhaden are used for reduction into fish

meal and oil. The meal is used in various animal foods and most of the oil is exported to Europe.

The pack of canned salmon in 1955 was 3,225,000 cases (the lowest pack since 1906), more than 900,000 cases below the 4,162,000 cases packed in 1954 and only a little over one-third of the record 8,955,000 cases packed in 1936.

The year saw a record production of fish meal and a good production of fish oils. Production of fish sticks, a recently-created specialty, reached a new high of between 65 million and 70 million pounds, compared with 50 million pounds for 1954, and 7.5 million pounds in 1953 when the production of this product was first undertaken.

Shrimp and haddock fillets, which early in 1955 showed extremely high inventories and a depressed market, are now practically in balance, with demand good and supplies adequate. Special marketing campaigns to move haddock, in which the Fish and Wildlife Service cooperated under provisions of the Saltonstall-Kennedy Act, aided in moving the heavy haddock inventories into consumption channels.

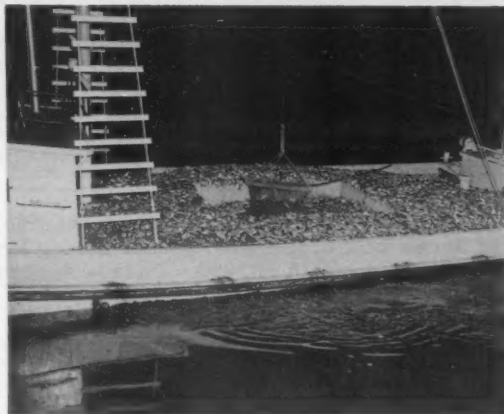
Shrimp is the United States' most valuable fishery on the basis of ex-vessel value. The high inventories which existed early in 1955 had a somewhat adverse effect. The 1955 catch was slightly below that of the previous year and the ex-vessel value was somewhat less than the \$70 million paid in 1954.

The Maine canned sardine pack of 1,300,000 cases was the lowest since 1940 and well under 1954's pack of 2,900,000 cases. The quality of the 1955 pack, however, is considered better than in any recent year due to the small size of the individual fish. The reason for the small catch this year is due to the absence of sardines in Maine waters.

The salmon catch was valued at \$24 million ex-vessel or \$10 million below that of 1954. The catch in 1955 was 286 million pounds as compared with 323 million in 1954.

Halibut landings of 37 million pounds were down 6 million pounds from 1954. In 1955 for a number of weeks during the season bad weather curtailed fishing. This, added to a decline in price, accounts for the drop in ex-vessel value from \$8 million in 1954 to \$5.4 million in 1955.

The catch of tuna was about 20 percent less than the 323 million pounds taken in 1954. The ex-vessel value of the tuna catch, based upon incomplete data, is estimated at \$35 million compared with \$52 million in 1954. During the first 10 months of 1955, about 129 million pounds of frozen tuna and nearly 42 million pounds of canned tuna and tunalike fishes were imported into the United States. In the same period in 1954, there were 111 million pounds of frozen tuna and 41 million pounds of canned tuna and tunalike fishes imported.



Unloading a boatload of menhaden at Pascagoula, Miss. Menhaden accounted for 40 percent of the total United States and Alaska catch.

U. S. Foreign Trade

GROUNDFISH FILLET IMPORTS DOWN 6 PERCENT IN NOVEMBER 1955: Imports of groundfish fillets (including ocean perch fillets) during November 1955 amounted to 11.1 million pounds as compared to 11.8 million pounds for the corresponding month the previous year, a decrease of 6 percent. (See chart 7 in this issue). The decline was caused primarily by somewhat lower imports from Canada and Iceland. Compared with the same month in 1954, Norway and Denmark also exported less groundfish fillets to the United States during November 1955. Groundfish fillets were also imported from Sweden, the United Kingdom, and France during November 1955, although none were brought in during the same month of 1954 from these countries. The Netherlands, West Germany, and Greenland exported somewhat more fillets to this country in November 1955 than in the same month a year earlier.

Canada continued to lead all other countries exporting groundfish fillets to the United States with 6.5 million pounds during November 1955--7 percent less than during the same month of 1954. Canada accounted for 58 percent of the total groundfish fillet imports during that month.

Groundfish fillet imports into the United States during the first 11 months of 1955 amounted to 124.8 million pounds, compared with nearly 132.0 million pounds during the same period a year earlier. This was a decrease of 5 percent. Canada, with 92.5 million pounds, led all other exporting countries during the 11-months period of 1955, followed by Iceland with 19.8 million pounds. These two countries accounted for 90 percent of the imports for the period.

* * * * *

United States Foreign Trade in Edible Fishery Products, September 1955 with Comparisons						
Item	Quantity			Value		
	Sept.		Year	Sept.		Year
	1955	1954	1954	1955	1954	1954
Imports:	(Millions of Lbs.)			(Millions of \$)		
Fish & shellfish; fresh, frozen, & processed ^{1/}	58.2	60.3	801.7	16.4	15.3	202.8
Exports:						
Fish & shellfish; processed ^{1/} only (excluding fresh and frozen)	4.1	5.4	50.8	1.7	1.3	13.2
^{1/} Includes pastes, sauces, clam chowder and juice, and other specialties.						

EDIBLE FISHERY PRODUCTS, SEPTEMBER 1955: United States imports of fresh, frozen and processed edible fish and shellfish in September 1955 amounted to 58.2 million pounds (valued at \$16.4 million), according to a U. S. Bureau of the Census summary report (see table). This was a decrease of 18.1 percent in quantity and 11.2 percent in value as compared with August 1955. Compared with a year earlier, September 1955 imports were lower by about 3.5 percent in quantity, but increased 6.3 percent in value.

Exports of processed edible fish and shellfish in September totaled 4.1 million pounds (valued at \$1.7 million), a decrease of 29.3 percent in quantity

but an increase of 5.9 percent in value as compared with August 1955. September 1955 exports were lower by 24.1 percent as compared with the September 1954 exports.



Wholesale Prices, November 1955

Winter and stormy weather at sea curtailed catches all along the Atlantic and Gulf Coasts, and supplies of fishery products during November 1955 were light. Wholesale prices in that month rose for nearly all types of fishery products except for canned fish, which sold at slightly lower prices. For November 1955 the overall index of edible fish and shellfish (fresh, frozen, and canned) was 112.0 percent of the 1947-49 average (see table)--higher than the previous month's by 4.3 percent and above November 1954 by 8.9 percent.

Table 1 - Wholesale Average Prices and Indexes for Edible Fish and Shellfish, November 1955 With Comparisons

Group, Subgroup, and Item Specification	Point of Pricing	Unit	Avg. Prices ^{1/}		Indexes (1947-49=100)			
			Nov. 1955	Oct. 1955	Nov. 1955	Oct. 1955	Sept. 1955	Nov. 1954
ALL FISH & SHELLFISH (Fresh, Frozen, & Canned)					112.0	2/107.4	109.2	102.8
Fresh & Frozen Fishery Products:					118.5	2/110.1	113.8	106.8
Drawn, Dressed, or Whole Finfish:					119.3	115.6	125.0	115.6
Haddock, lge., offshore, drawn, fresh	Boston	lb.	.12	.10	125.7	106.3	58.5	114.8
Halibut, West., 20/30 lbs., drsd., fresh or froz.	New York	lb.	.27	.32	84.6	99.3	133.1	93.4
Salmon, king, lge. & med., drsd., fresh or froz.	New York	lb.	.80	.60	133.7	135.1	140.4	127.5
Whitefish, L., Superior, drawn, fresh	Chicago	lb.	.75	.65	185.9	161.1	235.5	154.9
Whitefish, L., Erie pound or gill net, rtd., fresh	New York	lb.	.85	.80	171.9	161.7	222.4	115.2
Lake trout, domestic, No. 1, drawn, fresh . . .	Chicago	lb.	.65	.57	132.2	116.8	123.0	128.1
Yellow pike, L., Michigan & Huron, rtd., fresh .	New York	lb.	.44	.32	102.0	75.1	211.0	82.1
Processed, Fresh (Fish & Shellfish):					117.1	108.9	107.8	99.5
Fillets, haddock, sml., skins on, 20-lb. tins .	Boston	lb.	.36	.30	122.5	102.1	78.3	105.5
Shrimp, lge. (26-30 count), headless, fresh . .	New York	lb.	.64	.55	100.5	87.1	94.5	77.4
Oysters, shucked, standards	Norfolk	gal.	5.50	5.50	136.1	136.1	129.9	123.7
Processed, Frozen (Fish & Shellfish):					109.7	2/93.3	93.8	88.9
Fillets; Flounder (yellowtail), skinless, 1-lb. pkg.	Boston	lb.	.40	.39	104.7	102.1	102.1	98.2
Haddock, sml., skins on, 1-lb. pkg.	Boston	lb.	.29	.27	89.5	84.7	84.7	91.0
Ocean perch, skins on, 1-lb. pkg.	Boston	lb.	.27	.27	108.8	106.7	108.8	109.8
Shrimp, lge. (26-30 count), 5-lb. pkg.	Chicago	lb.	.71	.54	110.0	83.3	84.1	72.5
Canned Fishery Products:					102.6	103.4	102.7	96.8
Salmon, pink, No. 1 tall (16 oz.), 48 cans/cs. .	Seattle	case	21.70	21.70	114.8	114.8	114.8	104.4
Tuna, lt. meat, chunk, No. 1/2 tuna (6-1/2 oz.), 48 cans/ cs.	Los Angeles	case	12.60	12.80	90.8	92.3	92.3	93.0
Sardines, Calif., tom. pack, No. 1 oval (15 oz.), 48 cans/cs.	Los Angeles	case	7.38	7.55	86.1	88.1	88.1	3/
Sardines, Maine, keyless oil, No. 1/4 drawn (3-1/4 oz.), 100 cans/cs.	New York	case	8.20	8.20	87.3	87.3	81.9	71.3

^{1/}Represent average prices for one day (Monday or Tuesday) during the week in which the 15th of the month occurs. These prices are published as indicators of movement and not necessarily absolute level. Daily Market News Service "Fishery Products Reports" should be referred to for actual prices.

^{2/}Revised.

^{3/}Not available.

Except for lower prices on Western halibut and salmon at New York City, November 1955 prices for all other items in the drawn, dressed, or whole finfish subgroup were higher than the previous month and the same month a year earlier. Lighter landings in New England and Middle Atlantic ports were responsible for the limited salt-water finfish supplies available during the month, and stormy weather and closed seasons on the Great Lakes curtailed the supplies of the more popular fresh-water fish. Compared with the previous month, the fresh drawn, dressed or whole finfish subgroup index for November 1955 was 3.2 percent higher than the previous month and the same month in 1954.

Higher prices prevailed in November 1955 for the processed fresh fish and shellfish covered in the index, and the subgroup index for this category was 7.5 percent above October 1955 and 17.7 percent higher than in November 1954. Fresh haddock fillets and shrimp prices in November 1955 were substantially higher than the previous months and for the same month a year earlier.



Retail store in St. Louis, Mo., fluorescently illuminated with tiling and stainless steel trimming throughout, including interior and exterior of cases. Transparent lucite covers on cases.

zen fillet stocks were only moderate and demand was good, and in some instances supplies of frozen haddock and cod fillets were not considered adequate to meet the demand.

Ample supplies of canned tuna and California sardines and a moderate demand were responsible for the lower shading in prices which took place during the month. November 1955 canned tuna prices were 2.4 percent lower than in the same month in 1954. The subgroup index for all canned fish from October to November dropped 0.8 percent, but was still 6.0 percent higher than in the same period a year earlier because of higher prices for the limited supplies of canned salmon and canned Maine sardines. Tuna and sardine catches on the West Coast were reported good. The shore workers-cannery management dispute, which had practically closed down tuna and sardine canning for more than a month, was settled on October 31 and the canneries were packing full time again in November.



ACID-PRESERVED FISH SCRAP

Ensilage prepared from cod and haddock and preserved by H_2SO_4 has been fed successfully to pigs and chickens in Nova Scotia, Canada.

--Trade News (Canadian), January 1955.



International

GENERAL AGREEMENT ON TARIFFS AND TRADE

REVIEW OF TENTH SESSION: The Tenth Session of the Contracting Parties to the General Agreement on Tariffs and Trade produced encouraging indications that foreign governments are cooperating in the reduction of restrictions against United States goods which have been in use for balance-of-payment reasons. Discussions at the Tenth Session pointed up the fact that such restrictions have been significantly reduced during the current year, the U. S. Department of State announced on December 7, 1955. This was one of the principal points in a summary of the Session released in December. Other activities of the Session of general interest include the completion of plans for further tariff negotiations beginning in January 1956 and the initiation of discussions looking towards the lifting of the reservations which some countries placed upon their trading relations with Japan at her recent accession to the Agreement.

The Session was held at Geneva, Switzerland, from October 27 through December 3, 1955. The United States delegation, headed by United States Ambassador to Portugal, consisted of representatives of the Departments of Treasury, Agriculture, Commerce, and State.

Countries which have been restricting imports from other countries because of shortages of the currencies needed to pay for them are tending more generally to employ internal fiscal and economic measures, rather than import restrictions, to relieve pressure on their foreign exchange reserves. These measures include such actions as raising interest rates and tightening installment credit, thus dampening the demand for imports and making more domestic goods available for export.

A number of trade difficulties between individual countries, referred to the Contracting Parties under the "complaints" procedure of the Agreement, were satisfactorily settled. Another important development was a renewed request by the Contracting Parties that France move more rapidly towards the elimination of certain taxes upon imports.

Tariff Negotiations: Arrangements were concluded during the Tenth Session for a "Fourth Round" of tariff negotiations to be held in Geneva beginning in January 1956. The three previous rounds of negotiations were held at Geneva in 1947, at Annecy, France, in 1949, and at Torquay, England, in 1950-51.

Japanese Accession: The Contracting Parties discussed the problem created by the fact that, upon the accession of Japan to the Agreement last September, 14 countries exercised their right to refuse to apply the Agreement between themselves and Japan. The issue was discussed both in the regular meeting and in private consultations between interested countries, in an effort to work to-

ward a solution. The United States Delegation urged the other countries to extend the full benefits of the Agreement to Japan in order to expand export opportunities for Japanese goods. The problem will be kept under continuous study by all countries in the Agreement, and will be taken up again at intersessional meetings and at the Eleventh Session.

Balance-of-Payments Consultations: The Contracting Parties, with the assistance of the International Monetary Fund, held a number of consultations with participating countries that are applying restrictions on imports for the purpose of dealing with balance-of-payments difficulties. Australia, Ceylon, New Zealand, the Federation of

Rhodesia and Nyasaland, and the United Kingdom consulted on their import restrictions against dollar goods, as is required annually by the Agreement.

Consultations on Special U. S. Problems: The United States used the opportunity afforded by the Tenth Session to discuss informally with a number of countries some specific trade problems caused by the balance-of-payments restrictions which they have placed on imports from the United States. Such informal talks were held with the United Kingdom, the Federal Republic of Germany, France, Italy, Sweden, Norway, Austria, Finland, and Brazil. It is expected that these consultations will result in the easing of restrictions on particular commodities in a number of these countries.

Transport Insurance: Another noteworthy action by the Contracting Parties at the Tenth Session was the drafting of a resolution calling for the elimination of governmental restrictions which limit the freedom of buyers and sellers of goods to place transport insurance on the most economical basis. Such restrictions increase the cost of goods figuring in international trade and may create obstacles to trade.

The proposed resolution will be considered by governments during the coming year with a view to possible action at the Eleventh Session. It recom-

mends that governments avoid measures in the transport insurance field which have a restrictive effect on international trade and that governments now having such measures eliminate them as rapidly as circumstances permit. The resolution also requests that governments report on actions taken to eliminate such measures.

Status of Ninth Session Actions: During the session, governments reported on the status of their plans for accepting the Agreement on the Organization for Trade Cooperation (OTC) and the several protocols of amendments of the General Agreement which were drawn up at the Ninth Session. These instruments must be formally accepted by a prescribed majority of the Contracting Parties before they will enter into force. The United States Delegate reported that the United States has accepted the protocols of amendments to the General Agreement and that President Eisenhower has submitted the Agreement on the OTC to the Congress with a strong message of endorsement and the recommendation that legislation be enacted authorizing United States membership in the organization.

The Next Session: The Contracting Parties agreed to hold their Eleventh Session at Geneva beginning October 11, 1956.

TERRITORIAL WATERS

THIRD MEETING BY PERU, CHILE, AND ECUADOR ON TERRITORIAL WATERS: The Third Ordinary Meeting of the Permanent Commission for the Conservation and Exploitation of the Maritime Riches of the Southern Pacific was held at Quito, Ecuador, December 12-16, 1955. The Commission, composed of representatives of Ecuador, Chile, and Peru, with an observer from Costa Rica, took up technical and administrative questions but failed to go into the broader aspects of the 200-mile limit. The principal accomplishments of the meeting were agreements to exchange information, and the setting up of whaling quotas for the waters claimed by Ecuador, Chile, and Peru.

The Commission, which is composed of the three countries mentioned, is the result of a joint declaration by these countries signed in 1952 at Santiago claiming their sovereignty over a maritime zone 200 miles seaward from their coast. Costa Rica has since adhered to the declaration. At that time a permanent commission was created to meet periodically for the discussion of technical questions arising from the 200-mile claim.



Australia

NEW TUNA PRODUCTS INTRODUCED: A new factory for processing tuna into tuna chicken and smoked tuna-ham has been established in what was formerly a cargo shed at Bermagui on the south coast of New South Wales. If the products find favor with the Australian consumers, the new enterprise could utilize all of the current catch of tuna, according to the November 1955 Fisheries Newsletter, a publication of Australia's Commonwealth Director of Fisheries. Samples of the two solid-meat tuna products (which are cooked and ready to eat cold) inspected by the Australian Fisheries Office were attractive in taste and appearance.

The cargo shed has been rebuilt, with a cooking and a prefabricated refrigeration plant installed. The factory consists mainly of steam cooking and smoking rooms, plus freezing chamber and cold-storage equipment.

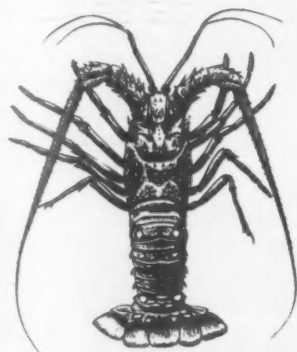
The initial processing plant can handle five tons of round fish daily. After fish have been filleted, the meat which is to become tuna chicken goes through a special preliminary processing and is then steam-retort cooked. Cooking time is less than the usual precook for canning, and this is claimed to retain more of the original flavors of the tuna. After cooking, the "chicken" is cooled, then frozen. The smoking of the ham is controlled by a system of air circulation and pressure, enabling accurate control of the process.

The factory is producing only on a sampling scale, but the manager hopes to be in commercial production by the end of October. The company plans to market the two products through distributors and is presently packing them in 28-lb. cartons, lined with greaseproof paper, but may later market an individual retail pack in cellophane. The ceiling retail price should be not more than about 45 U. S. cents per pound for the smoked ham and slightly less for the "chicken." The new firm is paying tuna fishermen about 6.5 U. S. cents a pound.



Brazil

SPINY LOBSTER FISHERY IN NORTHEASTERN BRAZIL: Spiny or rock lobsters are found in quantity off the coasts of the States of Ceara, Rio Grande do Norte, Paraiba, and Pernambuco, or the area called the "Bulge" of Brazil. The Latin names of the spiny lobsters caught in these waters are: *Panulirus guttatus*, *P. Argus*, and *P. Laevicauda*. The common Portuguese term for all is "Lagosta," according to an October 26 dispatch from the United States Consul at Recife. The production and marketing of spiny lobster in Northeast Brazil is still relatively unorganized, and the techniques employed are primitive. The spiny lobsters are caught in basketlike traps, and most of the fishermen operate from balsa rafts called "Jangadas," although some waders with torches work off the inshore reefs at night.



Spiny lobster (*Panulirus argus*)

within Brazil, and there have been some recent experiments with shipping chilled spiny lobster tails. The total quantity of spiny lobster entering commercial channels in Northeast Brazil is estimated to be about 80 metric tons per year. Consumption in the Northeast is relatively small, as no popular taste for lobster has been developed in this region. Americans and Europeans living in Brazil are the principal consumers of Brazilian spiny lobsters. Restaurant prices for spiny lobster in Sao Paulo and Rio de Janeiro are very high, but opinions differ widely as to whether or not the market there could be substantially expanded, with liberal shipments of fresh tails at more reasonable prices. Live spiny lobsters sell for only a few cruzeiros per kilogram in the more remote fishing villages in Northeast Brazil.

There are no freezing facilities in Northeastern Brazil and it will be necessary for any firm entering the lobster business there to construct its own freezer. Nearly all spiny lobster fishing in the Northeast is done by highly independent fishermen operating their own balsa rafts. These men are probably unprepared to provide a steady supply of large quantities of fresh spiny lobster, although they might be able to expand their present output considerably on occasion.



Canada

NEWFOUNDLAND'S ECONOMIC FISHERIES PROSPECTS PRESENTED TO ROYAL COMMISSION: Among numerous other natural and cultural resources needing Federal assistance, the case of fisheries was presented to the Royal Commission of Canada by the Premier of Newfoundland. Prior to the beginning of the 20th Century, fishing was about the only industry that played an important part in the settlement, communications, and living standards of "Canada's poorest Province." Since then other industries, such as mining and forestry, have played a more important part in the economy of Newfoundland, according to a November 16 dispatch from the United States Consul at St. John's, Newfoundland.

The Premier is more optimistic over the fisheries prospects than most Newfoundlanders. In his October 18 speech he belittled the approaches made by most statesmen to the problem of the depressed fisheries. Most politicians, he said, can offer nothing more constructive than suggestions that the fishermen seek work on the American bases or go to Ontario as carpenter apprentices. The Premier asserted that the fisheries have a potential "greater than can be grasped by any living man." During the First World War over 40,000 men were engaged in the inshore fishery. In 1951 there were 19,000 so employed, and by 1954 that number had declined to about 16,700 men. The reasons for the diversion of workers from the sea are to be found in the declining market for salt-dried cod and the consequent failure of salt-cod prices to assure the fishermen even as much as their old low standard of living.

Newfoundland's market has shifted, for currency and tariff reasons, from the European to the Caribbean area. The elastic demand in this latter area precludes any significant price rise, so that the only possible improvement in the Newfoundland fishing program would lie with a cut in the cost of production. If the United States and Canadian market for cod in frozen form were capable of considerably greater expansion than now seems possible and if the United States duty on frozen fish sticks had not been raised to 33 $\frac{1}{3}$ percent recently, the transition in types as well as location of markets might be made more easily. The Government's brief sees the lack of refrigeration and population increases in the tropical Catholic countries as a saving consideration for the salt-cod industry, if, at the same time, exchange rates become favorable enough to the Latin countries to make their demand for cod effective. Portugal and Spain remain potential markets for Newfoundland fish, since neither country produces enough for its own needs, but as long as the dollar value of cod keeps it out of their reach and if Newfoundland fishermen cannot cut their costs, the European market is uncertain.

The Premier makes no suggestion to the Federal Government and outlines no program for the Provincial Government. The future of cod fishing hangs on the success of artificial drying of fish (hopefully a cost-cutter), a larger slice of the North American frozen fish market, and tariff and exchange rates favorable to Latin consumers.

The Premier concludes that the biggest economic problem facing the Province is the condition of the fishery. The goal here is to raise the productivity of the

inshore fishermen, then to expand the market for frozen fish to take care of the planned capacity of 100,000,000 pounds annually. The Government makes no request for Federal aid and does not mention Federal unemployment insurance for fishermen.

* * * * *

GROWTH OF THE FISH STICK INDUSTRY: In Canada there are 7 to 8 plants producing fish sticks, and their production in 1954 amounted to 1.6 million pounds of sticks.

Some 25 plants on both the Atlantic and Pacific coasts, with the main volume concentrated in the former area produced 33.3 million pounds of blocks or slabs (the raw material utilized in producing fish sticks) in 1954. However, a large proportion of the blocks and slabs are exported to United States plants for processing into fish sticks.

In 1955 the expansion of the production of fish sticks and blocks and slabs continued. Production of fish sticks for the first eight months of 1955 reached 3.9 million pounds as against 1.1 million pounds for the same period of 1954. January-August 1955 production of blocks and slabs totaled 32.6 million pounds as compared with 17 million pounds for the same period in 1954, the November 1955 Trade News of the Canadian Department of Fisheries points out.

The expansion in fish stick production in both the United States and Canada raises the inevitable question of the effect of the new product on fish consumption in general, and upon the traditional fillet form in particular. Estimates would suggest that in Canada while there has been a strong consumer demand for fish sticks as well as an obvious need for filling the marketing "pipeline" from processor through to the retail outlet, there has been little or no increase in over-all consumption of fish products effected as a result of the new products.

While it is not possible to estimate accurately the impact of fish sticks in the Canadian domestic market, it is fair to assume that use of the product by Canadian housewives may have been somewhat slower than in the United States, but that the pattern of consumption will tend to follow that in the United States as supplies become more widely available and adequate refrigerated storage facilities increase.

Fish sticks in Canada are produced from a number of species of sea fish of Atlantic or Pacific origin as well as from certain species of fish from inland waters. However, Canada groundfish, principally cod and haddock, are the species most frequently used in the preparation of sticks.

Up to the present the Canadian fishing industry, as is the case with the industry in both Norway and Iceland, has developed as a supplier of the raw product--blocks and slabs. Fish sticks as such are produced almost entirely for the domestic market. The United States import duties on cooked and uncooked fish sticks have served effectively to bar the Canadian finished product from markets in that country.

* * * * *

NEW LABELING REGULATIONS PROPOSED FOR FISHERY PRODUCTS: The following amendment to Section 59 of the Canadian Fish Inspection Act has been proposed by the Department of Fisheries for implementation effective March 1, 1956, according to the November 4 Bulletin of the Fisheries Council of Canada.

SECTION 59: 1 All containers and wrappers in which fresh or frozen or processed fish is packed shall be correctly and legibly marked or labeled to indicate the following:

- a. the vernacular (common) name of the fish,

- b. the minimum net weight of the contents or the words "to be weighed at time of sale,"
 - c. the name and address of the person, firm, or corporation by whom or for whom they are produced and packed or by whom they are distributed, and
 - d. the words "Product of Canada."
- 2 Marking or labeling prescribed by subsections 1 (a) and 1 (b) shall be not less than $\frac{3}{16}$ -inch in height and shall appear on the main body or face of the wrapper.
- 3 No person shall mark, label, or package any fresh, frozen or processed fish in a manner that is false, misleading, or deceptive.

Note: By "fish" is meant all fish and shellfish products.



Colombia

FISH CANNERY FINANCES HERRING EXPLORATORY FISHING: The Barranquilla cannery, one of two fish canneries operating on the Caribbean coast of Colombia, recently financed a seven-day experimental trip by a California fishing vessel off the northern coast between Cartagena and Santa Marta, a December 6 United States Embassy dispatch from Bogota states. The California purse-seiner was sent out primarily for the local "flat herring" which this cannery cans as sardines.

The trip was not successful since only about 400 pounds of fish were caught, although several large schools were spotted which for various reasons could not be encircled.

Both the Barranquilla cannery and the other at Santa Marta have been entirely dependent on the very uneven supply provided by local fishermen using cast nets and similar primitive gear. Except for the heavy mullet season, running from October-January, the canneries operate at a small fraction of capacity and must resort to such unprofitable expedients as packing other types of products to keep going. The Barranquilla cannery can handle 15 metric tons of raw material a day.

The price of the canneries' output is high--68 U. S. cents retail for the 15-ounce oval can of sardines. Therefore, the Barranquilla cannery was able to offer the California vessel \$140 a ton for the fish caught.

The failure of the experiment is attributed primarily to insufficient knowledge of local conditions, waters, and fish habitats, and to insufficient capital to finance the necessary extensive exploration.

Discouraged by their long and fruitless efforts to establish a profitable business on the Caribbean coast of Colombia, the operators of the Barranquilla cannery recently opened a plant in Tumaco on the southern Pacific coast where they will endeavor to contract with the Pacific tuna fleet for supplies of fish. Should this be successful, the Barranquilla cannery will be closed down except during the mullet season.

It is understood that the Government is preparing a decree on the promotion of the fish industry in line with the recommendations made by a Spanish Food and Agriculture Organization expert who recently visited Colombia. However, it is not yet known whether these recommendations include provisions for an exploratory vessel.



Denmark

INTERNATIONAL FISHERIES FAIR TO BE HELD IN COPENHAGEN: An International Fishery Trade Fair will be held in Copenhagen May 18-27, 1956. Arrangements are in the hands of Universal Fair and Exhibition Service A/S, Copenhagen. This is the first fair of its kind in Denmark.

It is expected that exhibits will be held in the Forum building and in several other buildings in the harbor area. The Danish Ministers of Fisheries and of Commerce have agreed to act as patrons and advisers, together with representatives of other Danish organizations, both official and unofficial, which are concerned with fishing and fish trading and processing.

It is hoped to attract exhibitors from most European countries and negotiations for official exhibits are also said to be in progress, states a December 15, 1955 dispatch from the United States Embassy at Copenhagen.



Ecuador

FISH AND SHELLFISH EXPORTS, 1954--CORRECTION: In the October 1955 issue of *Commercial Fisheries Review*, the table "Ecuadoran Fish and Shellfish Exports, 1954" shows live spiny lobster exports to the United States, Panama, and Peru. It is believed from information now available that the data are for fresh and frozen shrimp instead of spiny lobsters.



El Salvador

NEW MARINE FISHING LAW ISSUED: In 1955 El Salvador issued a new marine fishing and hunting law (Legislative Decree No. 1961), which primarily establishes legal procedures and sets up processes for starting a fishing company. This new law is restricted to the actual fishing operations (all other aspects of the industry are regulated by a law for the development of industry--Legislative Decree 661), reports the United States Operations Mission to El Salvador.

Under the new law, the Ministry of Economy will regulate the marine fisheries for exploitation, domestic consumption, sport, and mixed fishing, for home use and for sale, and voids all previous legislation in conflict with the law. The general regulations of a marine fishery are now being prepared and will be issued in the form of a Ministerial decree.

Article 6, II, permits up to 50-percent investment of foreign capital in a Salvadorean fishing company. The next article (Article 7) lists the privileges granted under the law for a period of five years after its passage to companies going into fishing. After the five-year period, fishing companies will be subject to the regular taxes, import duties, and other contributions of ordinary business concerns.

All fishing vessels operating in Salvadorean waters must be of Salvadorean registry (Art. 16). This means they will have to belong to a Salvadorean company, which may have up to 50-percent foreign investment. Reports indicate that the question of tuna clippers obtaining a license to fish for bait in Salvadorean waters has been referred to a special law which will be passed at a later date.

Article 18 of the new law provides for fines of from US\$2,000 to US\$6,000 for fishing in Salvadorean waters without the proper permission. (The constitution of 1950 designates 200 miles as the offshore limits of Salvadorean territory.)



German Federal Republic

SEAWEED FLOUR: A German scientist, Heinrich Lienau of Flensburg, has started producing bread containing a small percentage of seaweed flour ("Algenbrot"), reports a December 6 dispatch from the United States Consulate at Hamburg. Lienau has been experimenting for decades with the utilization of seaweeds as fodder, and he now reports that he has been able to use certain kinds of seaweeds for human food. The experiments were started in Iceland, but World War II interrupted them. Lienau later started to work with seaweeds again in Germany after the war.

A special treatment is used to clean the seaweeds (Phaeophyceen) of parasites, shells, etc. To remove the excessive salinity, the seaweeds are washed in fresh water, dried, and coarse-ground. This product is packed in strong paper bags of 110 pounds each and sent to Hamburg where the coarse-ground seaweed is specially ground to prepare the product for mixing with common bread flour. Seaweed flour, which can be mixed with rye flour, wheat flour, and any other type of flour, is shipped to the bakeries in 100-pound paper sacks. Generally, 2 percent of the seaweed flour (soaked in milk or water until a gritlike paste is obtained) is kneaded into the bread dough. The percentage of seaweed flour may be increased according to taste and moisture content, but not more than 8 percent can be added otherwise a peculiar flavor is imparted to the bread, according to Lienau. It is reported that the nutritive value of the bread is improved by adding seaweed flour since it contains essential nutritive elements, vitamins, and trace elements missing in grain. The seaweed flour can absorb great quantities of moisture, and the bread is spongy. The bread with seaweed flour keeps longer than regular bread. Although a sea odor is observed when the bread is baking, the odor disappears when the bread is cooled.

Algenbrot besides being produced in Germany is also made in Belgium where sales are reported increasing. Production of this bread was also recently started in Austria.



Iceland

RUSSIAN-ICELANDIC TRADE AGREEMENT, 1956: Negotiations between Soviet Russia and Iceland towards a Trade Protocol for the calendar year 1956

Estimated Icelandic Exports of Fishery Products to Russia Under 1954 & 1955 Agreements		
Item	Estimated Value f.o.b.	
	1955 Agreement	1954 Agreement
	US\$1,000	US\$1,000
Fish fillets, frozen ...	8,173	7,011
Herring, frozen	166	-
Herring, salted	2,337	3,506
Unclassified	246	123
Total	10,922	10,640

agreed to supply Russia with a substantial amount of fishery products.

were completed. The agreement was amended to include a provision for an increase in the overdraft authority from about US\$615,000 to US\$1,230,000. In exchange for various nonfishery products produced by Russia, the Icelanders have

The agreement for 1956 includes the shipment of 20,000 metric tons of frozen fish fillets and 15,000 tons of salt herring plus miscellaneous products (some other fish products may be included in this category).

The dispatch also states that large-scale shipments of fishery products to Russia in November 1955 have helped to relieve the rather critical shortage of cold-storage space in Iceland. Cold-storage space in Iceland had become so short before November that quantities of fresh ocean perch were diverted to the reduction plants.

Agreement has now been reached for the U.S.S.R. to take a final 3,000 tons of frozen fish fillets under the 1954 agreement, but the Russians were unable to agree to take the final 2,000 tons which would have completely taken up the optional quantity specified under the agreement.



Indonesia

SHRIMP FISHERIES: Statistics on the catch of shrimp in Indonesian waters are incomplete, according to a dispatch from the U. S. Operations Mission to Indonesia. Catch data are available from fishery centers that have fish auctions, but it is believed that 15 percent or more bypass the auctions. The shrimp fisheries are extensive and widely scattered and many fishing villages are isolated, so that for many areas statistics are entirely lacking.

Estimated production in 1954 for the islands of Java and Madura are: "Rebon" (immature shrimp less than 1 inch long) 4,347,000 pounds and "Udang" (mature, more than 1 inch long) 957,000 pounds. The immature shrimp are used primarily in the preparation of fermented pastes.

The report states that the shrimp fishery potential is apparently unlimited, since extensive areas of marshland adjacent to the coasts of Sumatra, Java, and Kalimantan, with corresponding trawlable bottom offshore, are known to support shrimp populations. These resources are virtually unexploited at the present time. Local demand for shrimp is good and is probably limited only by price.

The amount of shrimp that is exported is unknown although there is an extensive but unknown trade between certain fishery centers adjacent to the Malay States, with shrimp products probably included in this trade. Fermented shrimp paste ("trasse") is one of the important products exported.

The lack of canning and freezing facilities, and the improbability of their being installed in the near future, indicate that Indonesia has no immediate prospects of becoming an important factor in the international trade for shrimp or other seafoods.

The Indonesians catch considerable quantities of shrimp in brackish-water ponds (used primarily for *Chanos chanos* culture); juvenile with a "sodo" (a scoop net pushed by hand in shallow water); with weirs and traps; with a sort of fyke net operated in river mouths and elsewhere in strong current; and reportedly with hand lines (for very large shrimp). There is no trawl fishery for shrimp at present.

A large part of the shrimp catch is processed to fermented pastes such as "trasse;" quantities are made into a dough with sago flour, cooked, and dried for later deep-fat frying to make a sort of shrimp chip. There is also a large market for fresh shrimp. The predominant type of shrimp is *Penaeus* sp., with the size ranging from $\frac{1}{2}$ inch to 14 inches or more.



Japan

DEVELOPING GOOD TUNA FISHERY IN INDIAN OCEAN: The tuna fishing in the Western Indian Ocean, developed by Japanese long-line fishermen, is yielding catches of 12-14 yellowfin per 100 hooks. This is a much higher catch rate than on any other grounds fished by the long-liners.

The Nankai Regional Fishery Research Laboratory, the Japanese government agency most active in tuna research, is planning to investigate oceanography and tuna ecology on the long-line grounds of the Indian Ocean. The expedition, which will be made in cooperation with the fisheries department of the University of Kagoshima, is using the University's training ship Keiten Maru (510 tons). The training ship was scheduled to sail January 4 and return about the middle of March, according to Nippon Suisan Shimbun, a Japanese trade publication.

On December 3, 1955, the No. 2 Seiju Maru (750 tons) returned to the port of Shimizu, Japan, with a full load of 425 tons of yellowfin and big-eyed tuna after an 80-day voyage that extended across the Indian Ocean to the vicinity of the African coast. The average day's catch was reported as about 12 tons of yellowfin. It is said that 70 percent of the catch passed inspection as suitable for export, that the proceeds of the voyage will amount to about US\$90,000, and that crew members will receive about US\$275 each for the trip.

In addition, the large tuna mothership No. 21 Kuroshio Maru (1,858 tons) returned on December 4, 1955, from the new fishing grounds in the Arabian Sea region with 1,063 tons of fish, valued at over \$160,000. About 70 percent of this catch was slated to be canned for export. On December 18 the Kuroshio Maru again sailed for the fishing grounds off Somaliland and Madagascar.

* * * * *

LONG-LINING FOR SALMON PROPOSED: Fishermen of northern Japan, eager to enter the profitable northern salmon drift-net fishery but prevented from doing so by the Japanese Fisheries Agency's strict limitation on the number of licenses, are planning to try long-lining for salmon on the northern grounds. Under present regulations it is considered that this would be an open unlimited fishery. Basic studies of the method are being made by the Fukushima Prefecture Fishery Experiment Station, states the Japanese trade publication, Nippon Suisan Shimbun.

* * * * *

LONG-LINER PRESERVES TUNA BY "AIR FREEZING": The new tuna boat, the Jingu Maru (499 tons), returned to port in Japan on December 3, 1955, from its maiden voyage with 330 tons of fish preserved by "air freezing," a method of preservation that is used aboard the tuna motherships but which was being tried for the first time aboard a Japanese tuna long-line boat. The greater part of the load was in such a good state of freshness that it was suitable for consumption as fresh raw fish, despite the 4 months' duration of the voyage. This success is attracting much attention at Misaki, where it is considered an epoch-making development, the Japanese trade publication Nippon Suisan Shimbun reports.



Mexico

REVIEW OF FISHING INDUSTRY, 1953-55: Catch: According to statistics compiled by the Fishing Office of the Ministry of the Navy, fish and shellfish catches in Mexican waters (including the fish caught by United States and other foreign vessels) reached a peak of 140,548 metric tons in 1951, and in the subsequent three years has varied

Table 1 - Catch of Fish and Shellfish in Mexican Waters, 1/ 1953-54

Species	1954	1953	Species	1954	1953
	(Metric Tons)			(Metric Tons)	
Albacore tuna	995	1,905	Mullet 1/	1,757	909
Skipjack tuna	8,471	6,177	Shrimp 1/	20,061	19,671
Other tuna	36,764	47,883	Oysters	7,235	6,883
Bonito	440	1,252	Abalone	1,528	1,626
Yellowtail	945	1,210	Lobster, spiny	1,111	1,033
Sardines	5,553	4,717	Crabs	651	718
Grouperlike fishes	3,286	3,497	Clams	377	783
Sea bass (robalo)	2,567	2,662	Turtles	298	263
Sierra	1,891	2,514	All other fish		
Corvina	1,253	920	and shellfish 2/	13,534	11,404
(Continued in opposite column)			Grand total	108,717	116,027

1/ Includes fish caught by United States fishing vessels in Mexican waters.

2/ Includes about 100 species of fish and shellfish.

less than 5 percent from the average annual catch of 110,848 tons. The principal volume items, shrimp and tuna, accounted for over half of the total in 1954 (table 1). Catch statistics for 1955 are not yet available, but the shrimp catch is understood to be very satisfactory for that year off both coasts. The tuna catch, however, declined 25 percent from 1953 to 1954 and probably declined further in 1955. Most of the tuna is caught by United States fishing vessels operating out of Southern California. The 1955 spiny lobster catch is thought to have been moderately greater than in previous years, according to a December 14, 1955, report from the United States Embassy at Mexico City.

Table 2 - Canned Fish and Shellfish Pack in Baja California, 1953 (4 principal canneries)

Kind	Quantity
	(Metric Tons)
Abalone	1,307
Anchoveta	40
Corvina	11
Mackerel	744
Sardines	7,123
Skipjack tuna	120
Tuna	141
Total	8,486

The "red tide" caused some anxiety in October in the area below Tampico to the base of the Yucatan peninsula, but did not hamper fishing operations seriously.

Foreign Trade: The volume of exports in 1954 declined about 4 percent from the previous year, but the value of exports in terms of pesos rose 18 percent, according to Ministry of Economy statistics. The increase in value reflects a rise in peso quotations after the 44.5 percent devaluation of the peso in April 1954. Frozen shrimp represented 83 percent of the value of seafood exports in 1954. Export statistics through September 1955 show an increase over the same period of 1954 of 17 percent in the volume of shrimp exports and an increase of 9.6 percent in value. The figures for shrimp exports in the first nine months of 1955 are 12,029 metric tons, valued at US\$8,294,635.

Imports declined by 16 percent in total volume from 1953 to 1954, although the value in pesos increased slightly. The United States supplied less than 6 percent of the value of total imports. These imports, which were valued at less than 6 percent of Mexican exports of seafood, consisted primarily of dried cod and salted or smoked fish of unspecified species.

Prices: Although tuna is the most important catch in Mexican waters, this fish is not exported in significant quantities by Mexican packing companies. The whole-

Table 3 - Mexican Fishery Byproducts
Production, 1953-54

Product	Quantity	
	1954	1953
	(Metric Tons)	
Marine Oils:		
Whale	6.2	-
Swordfish	2.8	1.6
Shark-liver	15.9	10.5
Other	263.7	163.7
Algae gelidium	75.0	142.8
Other algae	121.3	36.5
Shells:		
Abalone	188.3	119.7
Oyster	59.0	40.6
River	216.9	15.2
Nacre	32.4	7.4
Other	10.4	10.4
Sponges	0.2	-
Fertilizer materials	2,316.5	1,356.6
Shark livers	100.6	101.4

sale price of canned tuna in Mexico City is US\$12 per case of 48 cans, each can weighing approximately 7 ozs. United States fishing vessels catch considerable tuna in Mexican waters; such tuna appears in Mexican production statistics, but not in the export statistics.

The value of frozen shrimp exports greatly exceeds the value of all other fish and shellfish exports. The American Consulate in Merida, Yucatan, reports that the average prices at Brownsville, Tex., during the third quarter of 1955 for frozen 15-20 count brown shrimp for primary sellers were as follows: July 66 U. S. cents, August 62 U. S. cents, and September 60 U. S. cents.

Canned abalone has been the second most important export product in recent years. A leading canner quotes a case of 48 No. 1 cans at about US\$20 f.o.b. San Diego, Calif. Most of this canned abalone is transhipped to the Orient.

Table 4 - Mexican Exports of Fish and Shellfish, 1953-54

Commodity	Quantity		Value	
	1954	1953	1954	1953
	(1,000 Pounds)		(Equiv. in US\$1,000)	
Unprocessed fresh:				
Clams	335	1,213	12.5	67.2
Turtles	324	326	2.6	3.8
Processed:				
Fish fillets	487	428	33.1	40.3
Fish, fresh, refrig., frozen	7,427	5,229	482.6	432.1
Fish, dry, salted or smoked	82	351	5.0	110.7
Lobster, spiny, cooked	1,870	1,766	624.2	501.6
Frog legs	9	15	1.8	2.8
Crustaceans	-	7	-	0.5
Shrimp, dried	22	4	4.9	1.4
Shrimp, fresh or refrigerated	331	335	96.0	104.3
Shrimp, frozen	33,631	35,311	11,255.6	14,019.2
Mollusks	-	40	-	2.7
Canned:				
Abalone	3,419	4,894	1,103.0	1,536.9
Shrimp	13	26	3.9	11.3
Lobster, spiny	2	2	0.2	0.2
Oysters	-	2	-	0.6
Sardines	2	-	0.4	-
Other	9	9	2.3	3.1
Total Exports	47,963	49,959	13,628.1	16,838.7
Exports to U. S.	47,450	49,456	13,577.6	16,678.6

Note: It is believed that in 1952 and earlier years very substantial exports of fresh, refrigerated, or frozen fish included the catch in Mexican waters of United States fishing vessels, but in 1953 and 1954 statistics included only exports of Mexican-caught fish.

Canned spiny lobster has been the third most important export product in recent years. A trade source states that a lobster company in Ensenada, Baja California, is the sole exporter in that area by agreement with the Banco de Fomento Cooperative. Recent average prices of frozen spiny lobsters landed in San Diego are understood to be about 70 U. S. cents per pound. The current wholesale price of fresh lobster in Mexico City varies between 43-55 U. S. cents per pound, according to type and grade.



A typical Mexican shrimp trawler.

A number of new fishing boats are now under construction, particularly in the Ciudad Carmen shrimp area, and proposals to establish freezing, refrigeration, and processing plants in a number of ports are under consideration by the Ministry of Navy and private industry. However, budgetary limitations will probably prevent the Navy from executing any large-scale facilities in the near future.

According to a brief item published in a Mexico City financial newspaper in September 1955, US\$17.1 million will be invested in the construction of five packing, reducing, and dehydrating plants at Manzanillo, Colima. A company is reported to have been formed to operate these important new seafood plants. This unconfirmed press item stated that the large investment would be financed jointly by public and private capital. But whether this particular project will be realized as stated or not, it is evident that both private investors and government officials believe there are attractive investment opportunities in the processing of seafood in this country.

Note 1: Quantities and values shown are probably minimums because catch and production data are based on declarations for tax purposes.

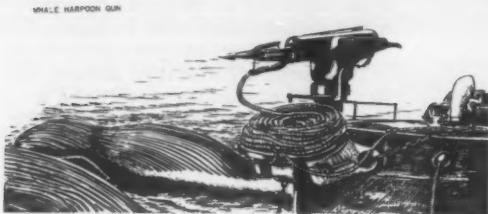
Note 2: Values were converted to U. S. dollar equivalents as follows: 1954--12.49 pesos equal US\$1; 1953--8.60 pesos equal US\$1.

Commodity	Quantity		Value	
	1954	1953	1954	1953
	(1,000 Lbs.)		(Equiv. in US\$1,000)	
Live fish & shellfish, .	33	4	6.1	2.8
Unprocessed fish & shellfish	148	152	33.0	44.5
Processed:				
Caviar	4	4	6.6	11.5
Salmon, canned . . .	29	46	10.7	20.9
Cod, dried	670	1,175	237.3	466.9
Fish, salted or smoked	1,508	1,563	404.6	475.9
Shellfish, dried, salted or canned . .	203	173	80.1	88.1
Total Imports	2,595	3,117	778.3	1,110.6
Imports from U. S. . .	152	205	46.0	63.7

Netherlands

WHALING PRODUCTION, 1954/55: Production by the only Netherlands firm operating in the Antarctic whaling industry amounted to 10,948 metric tons of oil and other products during the 1954/55 season. The production consisted of 9,827 metric tons of whale oil, valued at US\$234 a ton, and 1,086 metric tons of sperm oil, valued at US\$200 a ton. Miscellaneous products totaled 35 metric tons.

Despite better prices received for the oils during 1954/55 as compared to 1953/54, the total value received amounted to only US\$2.6 million in 1954/55 as compared with US\$3.5 million the previous season. The sharp drop of US\$0.9 million was the result of a poor catch due to bad weather conditions. The nominal profit, therefore, totaled only US\$257,249. In order to cover depreciation and maintenance expenses, as well as Government-guaranteed dividends, payments, and reserves, the Netherlands Government paid to the company a subsidy of US\$1.6 million.



During the 1955/56 Antarctic whaling season, the Netherlands is participating with its new factoryship for the first time. This factoryship, the Willem Barendsz, is the largest ship of the Netherlands merchant marine. It will be accompanied by 18 catchers, as compared with the 12 catchers that took part in the 1954/55 expedition. The total production of oil from the 1954/55 expedition was approximately 12,070 short tons.

To date, 16,535 tons of the 1955/56 production of whale oil has been contracted for in advance; 11,023 tons at US\$217 per short ton and the remaining 5,512 tons at US\$216 per ton. In addition, 2,756 tons of sperm oil have been contracted for at US\$178 per short ton.

The 1954/55 season's first-quality whale oil sold for US\$213 per short ton; the average price for sperm oil was US\$182 per ton.

The catch of the old Willem Barendsz in 1954/55 amounted to 116 blue whales, 601 fin whales, and 3 Greenland whales--a total of 720 whalebone whales plus 128 sperm whales.

Both the numbers of whales and blue-whale units ^{1/} caught during the 1954/55 season were considerably below those of the previous year. The number of whale units caught was 417, compared with 852.1 in the 1953/54 season. A total number of 413.5 units were processed, compared with 836.7 in the previous season. However, because the extraction was relatively favorable this year, whale-oil production was larger than might have been expected by comparing the whale units processed during the two successive seasons.

^{1/} One blue-whale unit is 1 blue whale; 2 fin whales; 2 ¹/₂ humpback whales; or 6 Greenland whales.



Norway

FISHERY TRENDS, DECEMBER 1955: Herring: Price negotiations between fishermen and the Fisheries Ministry of Norway for the 1956 herring season have been completed. The guaranteed average landed price for large herring was fixed at about 1.43 U. S. cents per pound and for spring herring at 1.23 U. S. cents per pound, about \$0.2 U. S. cents over 1955.

Cod: Negotiations on minimum cod prices for the 1955/56 season were still under way, according to a dispatch from the United States Embassy at Oslo. It is believed in fishing circles that the price for Lofoten cod will be set at about 5.1 U. S. cents per pound for fish over 16.5 inches long, approximately 1.8 U. S. cents over 1954. Minimum prices for smaller and less valuable grades of cod are expected to be less than the 1954/55 prices in order to compensate for the increase in the price of large cod.

1955 Mackerel Season: It was announced at a meeting of the Norwegian Mackerel Association in December that 10,800 metric tons of mackerel were caught during the 1955 season, an increase of 400 tons over 1954. This is still well below the normal year's catch, estimated by the trade at between 13,000-14,000 tons.

Canned Brisling in 1955: Due to the poor brisling (sardine) catch in the 1955 season, only 247,000 cases had been packed through November 19, 1955, compared with 419,700 cases during the same period of 1954. The season was about over on that date and it has been characterized by the industry as the worst in decades. The canning industry also suffered from less than normal packs of sild sardines and mackerel.



Hauling in the seine--Lofoten cod fishery.

as much in Italy as the Icelanders. The decline in Norwegian sales to Italy has been relatively small--from 2,067 metric tons in the first seven months of 1954 to 1,853 tons during the same period in 1955. Norwegian exporters point out that their product is still largely competitive due to its high quality.

Guaranteed Wage for Fishermen: The Norwegian Storting has passed a measure to guarantee a weekly wage of about US\$10.50 to herring and cod fishermen. Only fishermen on boats at least 25 feet long with crews of two or more are eligible. A fund of US\$840,000 has been established, to be administered by the Norwegian Fishermen's Association. The export levy on all fish and fish products will be raised 50 percent to cover the costs of establishing the fund. The 1953 and 1954 cod catches were the smallest in years. Wages, based on the individual fisherman's shares and equipment, were very low and the Government was forced to extend US\$420,000 in emergency relief in the Lofoten area in 1954. In 1953, a similar fund was set up, but with a much narrower scope; it applied only to the relatively small number of fishermen on large vessels on trips of at least four weeks' duration. This new fund should go far in alleviating the economic hardship to the fishermen in a poor season.

Loans for Nylon Nets: The Storting in December 1955 appropriated US\$700,000 for loans to fishermen to buy nylon nets. The loan will be made through the State Fisheries Bank at 3½ percent interest to full-time cod fishermen. The size of the loan may be set by the Bank, and it can cover 75 percent of the cost of the nets, up to US\$14 per net. Nylon nets yield catches up to four times the size of other nets currently in use, but they are far more expensive. The problem of financing by the individual fisherman has been the main stumbling block up to now. The Government considered that loans to individual fishermen was preferable to a subsidy on nylon nets, both for financial reasons and because of its policy to keep the small fisherman competitive with larger enterprises.

NEW WHALE CATCHER LARGEST EVER BUILT: The Nortreff, just completed at Fredrikstad, Norway, for Norwegian owners, is described as the world's largest

whale catcher. The vessel is 215 feet in over-all length, 33 feet in breadth, and 18 feet 6 inches in depth, reports The Fishing News (November 25, 1955), a British fishery periodical. The gross tonnage of the vessel is 901 tons. The hull and main deckhouse are of steel, but all other superstructure is of aluminum. Total cost of the vessel was about US\$784,000.

HERRING CATCH LOWER IN 1955: The results of the Norwegian 1955 herring season were announced at the Norwegian Herring Marketing Cooperative meeting in Bergen early in November 1955. The 1955 catch was 2,153 million pounds, valued at US\$29.1 million, compared to the previous year's 2,399 million pounds, valued at US\$29.4 million. In 1955, 1,646 million pounds of large herring and 472 million pounds of spring herring were taken, while the balance consisted of other types of herring, a November 10 United States Embassy dispatch from Oslo points out.

The herring oil and meal industry in 1955 received 1,579 million pounds of herring, corresponding to about 150,000 metric tons of meal and 63,000 tons of oil. Production of these byproducts in 1954 was 170,000 tons and 78,000 tons, respectively. All the 1955 production of herring oil has been sold, mostly to the Norwegian fat supply and canning industry.

Exports of herring for 1955 have been satisfactory in both volume and price terms. The export of iced fresh winter herring increased from 476,000 barrels in 1954 to 688,500 barrels in 1955. The export of frozen herring was the highest on record, with 598,000 cases of large herring and 287,000 cases of spring herring delivered to 17 countries.

FISHERY BYPRODUCTS PLANTS INSTALL EQUIPMENT TO RECOVER STICK-WATER: Stickwater units, utilizing the waste water from fish and whale reduction, have so far been installed in 40 plants in Norway and abroad, reports the Norwegian Information Service (December 15, 1955). The machinery is supplied by a Norwegian engineering firm at Haugesund, Norway. A unit model of the machinery is on display at the Norwegian Chamber of Commerce, New York, N. Y.

These units have been installed aboard all floating whale factoryships at most whaling shore stations, including some in Australia, Peru, and South Africa, reports the firm, which claims that its machinery which recovers the stickwater of fish and whale reduction can boost the yield of fish and whale meal by some 20 percent.



Peru

NEW WHALING COMPANY FORMED: A new whaling company has been formed in Peru by a combine of French, Norwegian, Panamanian, and Peruvian interests. The new firm will use the Janine (formerly the Anglo Norsk) as the central unit of the fleet.

The company has obtained a permit from the tripartite Commission (Chile, Peru, and Ecuador) to catch whales in the 200-mile zone along the coasts of the three countries. This permit was granted at the meeting of the Commission in Quito, Ecuador, in December 1955. At the meeting it was also decided that the total annual quota for deep-sea whaling in the 200-mile zone will be 2,100 sperm whales. It is believed that it is highly improbable that any licenses will be granted

to nonnationals. At the present time there is no limit placed on the catch of whales from land stations, states a December 28 report from the United States Embassy at Lima.

* * * * *

DEFENSE OF TERRITORIAL-WATERS CLAIM: *La Nacion* (Government newspaper) in an editorial on December 12, 1955, on the subject of 200-mile jurisdiction refers to the action of the Organization of American States in calling a special meeting on questions of the continental platform to be held in the Dominican Republic in March of 1956. This convention is described as being one to study and solve economic, jurisdictional and scientific problems related to maritime jurisdiction and defense of the natural resources of the maritime zone.

The editorial refers to the Tripartite Declaration of Santiago of 1952 and its ratification in Lima during the past year by the member countries of the Permanent Commission of the South Pacific at its second meeting. The statement is added that "today the third such meeting is taking place in Quito" in order to perfect the regulations signed and ratified by the three countries. In this connection the editorial adds that the thesis of the countries of the South Pacific, originally Peruvian, has been accepted in principle by Colombia, Mexico, Costa Rica, El Salvador, and Uruguay, all of which have sent observers to the meeting which begins today in Quito.

The editorial also refers to Peru's action in punishing an international pirate firm, thus protecting Peru's ichthyological resources. Reference is made to the meeting of the International Whaling Convention which subsequently accepted the Norwegian protest against violation of the convention by Onassis, thus confirming the Peruvian thesis.

The editorial continues that at the International Convention at Trujillo there will be a new discussion of the economic aspects of the doctrine of the continental shelf as it has been affected by the technical developments of submarine petroleum deposits. The statement is made that it was the United States which first formulated the doctrine of the continental platform in 1947. Since that date the capacity for exploitation of petroleum resources under the sea has increased and this activity can now be carried on in greater depths and at greater distances from the coast. Thus, the editorial claims, economic aspects support the thesis of the 200 miles as well as the necessity of conserving fish resources. Furthermore the concepts of national defense have changed, making antiquated the former concepts of marine jurisdiction. All of these facts make it necessary to change the concept of marine jurisdiction. The editorial concludes by saying that the most important point is that any change in principles should benefit equally and fairly all the countries of the continent, and therefore one may be confident of the unanimous acceptance of the Peruvian thesis in the coming Inter-American conference regarding the continental platform.



Portugal

FISHERIES TRENDS, AUGUST 1955: Sardine Fishing: During August 1955 the sardine fishing was good both in terms of tonnage and value, states the November 1955 *Conservas de Peixe*, a Portuguese trade periodical. Fishermen landed 13,593 metric tons of sardines (ex-vessel value US\$1,665,000) as compared with landings of 12,834 tons (value US\$995,000) in August 1954. The canners purchased 8,356 tons of the total at a cost of US\$1,102,000. The balance of 5,236 tons was used for

local consumption. The port of Matosinhos with 58.6 percent of the total landings led all others in the landings of sardines in August, followed by Portimao with 13.5 percent. Prices paid to the fishermen in August for sardines were about 5.5 U. S. cents per pound as compared with about 3.5 U. S. cents in August 1954.

Other Fishing: January-August landings of other fish were: tuna 1,332 tons (ex-vessel value US\$379,200), bonito 13.4 tons (value US\$17,217), mackerel 4,075 tons (value US\$501,183), anchovies 3,528 tons (value US\$690,817), and chinchard 20,574 tons (value US\$1,262,957).

* * * * *

FISHERIES TRENDS FOR 1955--CORRECTION: In the October 1955 issue of *Commercial Fisheries Review*, page 100, the last paragraph of the item titled "FISHERIES TRENDS FOR 1955" was incomplete. It should have read as follows:

Modernization of the cod fleet and the addition of new and larger units contributed to the larger catch in 1954 and 1955. The Portuguese cod fleet in 1937 comprised 51 small sailing ships, totaling 17,300 gross tons. The fleet now aggregates approximately 70,000 gross tons, with a total complement of 5,000, which is more than triple the 1937 total. Despite the increase in Portuguese cod consumption since 1937, when population increased by more than a million, imports of cod (34,945 metric tons in 1937) decreased in 1954 to 13,548 metric tons, valued at 105 million escudos (US\$3,700,000).

* * * * *

CANNED FISH PACK, JANUARY-JUNE 1955: The supply of fish available to the Portuguese canners during June 1955 was good and the pack included 1,831 metric tons (94,400 cases) of sardines in oil or sauce. The total pack of all canned fish from Jan.-June 1955 was 9,897 tons of which 5,779 tons were sardines in oil or sauce, according to the November 1955 *Conservas de Peixe*.

Portuguese Canned Fish Pack, January-June 1955					
Product	Net Weight		Product	Net Weight	
	Metric Tons	1,000 US\$		Metric Tons	1,000 US\$
Sardines in brine	398	60	Tuna in brine	12	6
Sardines in olive oil or sauce	5,779	3,097	Tuna in olive oil	487	415
Sardinelike fish in brine	658	198	Tunalike fish in olive oil	73	45
Sardinelike fish in oil	1,235	673	Other species (including shellfish)	480	250
Anchovies, rolled & fillets	775	819	Total	9,897	5,563
(Continued in opposite column)					

Note: Values converted to US\$ equivalent on the basis of 28.75 escudos equal US\$1

Note: Values converted to US\$ equivalent on the basis of 28.75 escudos equal US\$1.

* * * * *

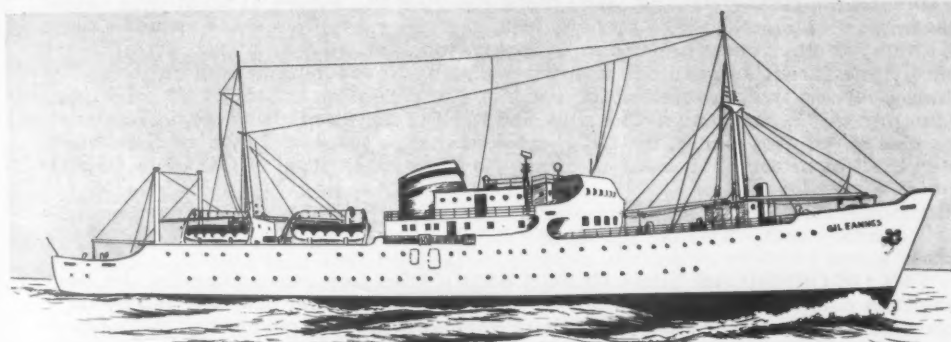
CANNED FISH EXPORTS, JANUARY-AUGUST 1955: Portuguese canned fish exports totaled 5,385 metric tons (283,400 cases), valued at US\$2.7 million, during August 1955; and 37,505 tons, valued at US\$19.1 million, during January-August 1955.

Portuguese Canned Fish Exports, August 1955 and Comparisons							
Species	Aug. 1955		Jan.-Aug. 1955		Species	Aug. 1955	
	Metric Tons	1,000 US\$	Metric Tons	1,000 US\$		Metric Tons	1,000 US\$
Sardines in olive oil	4,069	1,919	29,855	14,622	Tuna & tunalike in olive oil	209	151
Sardinelike fish in olive oil	480	329	3,149	2,110	Tuna & tunalike in brine	79	46
Sardines & sardinelike fish in brine	264	59	1,291	247	Mackerel in olive oil	267	152
(Total in opposite column)					Other fish	17	11
					Total	5,385	2,667

37,505 19,067

Portugal's export of canned fish in August 1955 maintained the high level of previous months, according to *Conservas de Peixe*, November 1955. During January-August 1955 Germany continued as the leading receiver with US\$3.5 million of canned fish (principally sardines in oil), followed by Italy with US\$3.2 million (principally sardines and tuna), Great Britain with US\$2.5 million, and the United States with US\$2.2 million, principally 1,752 tons of sardines in oil or sauce, 10 tons of tuna and tunalike fish in oil, and 1,118 tons of anchovies.

SERVICES OF HOSPITAL SHIP OFFERED TO CANADIAN FISHERMEN: For close to five centuries Portuguese fishermen have been reaping rich rewards from the prolific cod banks off Canada's east coast, receiving a warm welcome and using facilities available at Canadian ports. Reciprocating this favorable treatment, the



Gil Eannes, new Portuguese hospital ship for cod fishing fleets in the North Atlantic.

Portuguese are sharing with Canadian deep-sea fishermen the medical and other assistance provided by a deluxe hospital ship which each year spends five months in Newfoundland and Greenland waters with Portugal's cod-fishing fleet.

This assistance will be given by the *Gil Eannes*, mothership of the Portuguese cod-fishing fleet, which was launched in 1955 and made her maiden voyage to the Northwest Atlantic in May 1955. Advice that such aid would be provided free of charge to Canadian nationals was recently tendered the Canadian Department of External Affairs by the Portuguese Embassy in Ottawa. It will be of particular importance to fishermen operating on the Grand Banks where the Portuguese fleet obtains a large share of its catch.

The Portuguese cod-fishing voyages are conducted by both draggers using otter trawls and the picturesque white-hulled bankers which employ the traditional line gear in trawling from dories. The draggers, numbering about 25, leave for the western waters in February and the dory trawlers, totaling some 45, in April. All told, they carry a complement of approximately 5,000 men.

To assist them throughout the voyage, the Government of Portugal sends a mothership as a guarantee to the fishermen that they will not be abandoned during the voyage. In previous years that assistance was given by warships and later a merchant ship was transformed into a hospital ship and named the *Gil Eannes*. As this ship was growing too old for the purpose a new ship was especially built for this work and also named the *Gil Eannes*.

The hospital ship joins the fishing fleet on the Grand Banks in May and accompanies it in June when most of the vessels sail north for the waters off Greenland.

Many of the vessels, with the Gil Eannes, subsequently return to the Grand Banks in September for further fishing, and leave for their home ports during the early part of October.

Hospital facilities on the Gil Eannes include two well-equipped operating rooms, up-to-date therapeutical appliances, two isolation wards, and a glass-partitioned general ward with beds for 74 patients. In addition to the staff of doctors and male nurses aboard the ship, there are also a number of trained personnel distributed throughout the fleet who are available for service when called upon. The Gil Eannes is also the focal point of the fleet mail service and for the distribution of general supplies. The vessel is especially designed for the role of mothership and the sight of her gleaming white hull, sailing among the fishing vessels, strikes a note of confidence in the men.

During the fishing season all of the ships visit St. John's at least once, some on several occasions, to take on bait, fuel, and other supplies, have repairs made and attend to other chores that can be better done ashore than afloat. It is in gratitude for the facilities granted for many years by Newfoundland authorities to the fishing fleet and in appreciation for the friendly reception accorded the visiting fishermen that the Portuguese authorities and the Portuguese Ship Owners' Association have placed the services of the Gil Eannes at the disposal of Canadian fishermen, states the November 1955 issue of Trade News, a publication of Canada's Department of Fisheries.

* * * * *

TAX ON OFFSHORE TUNA CATCH REDUCED: In a move to assist the Portuguese tuna canning industry, the tax on the catch of tuna and tunalike fish by off-shore vessels has been reduced by the Government from 7 percent ad valorem to about US\$1.23 a metric ton. This new rate will apply only to the September 1955-April 1956 season, states a November 25, 1955, dispatch from the United States Embassy at Lisbon.

Replacement of the ad valorem rate by the lower rate is designed to enable off-shore tuna-fishing vessels to sell the catch profitably in the domestic market for canning or for export as frozen tuna. Heretofore, the relatively high ad valorem rate usually forced operators of seagoing-tuna vessels to sell their catch in foreign markets, chiefly in Italy. Sales of frozen tuna direct to foreign markets by operators of the two seagoing Portuguese fishing vessels which are known to have sold tuna abroad in 1954 totaled 958 metric tons, all of which was sold in Italy. Frozen fish landed in Portugal in 1954 and later exported to foreign countries and to the Portuguese overseas territories in that year totaled 625 metric tons.

The two fishing vessels which will apparently benefit from the new tax reduction are both converted Diesel-engined submarine chasers of 840 gross tons each, operated from the port of Aveiro near Oporto. Both vessels have refrigeration facilities, radio, modern depth-sounding equipment, and gyrocompasses.

The new tax measure includes provisions authorizing the establishment of cold-storage facilities ashore in the Azores Islands for the tuna catch, and regulations covering customs control of the catch.



South-West Africa

PILCHARD-MAASBANKER FISHERY: The South-West Africa annual catch quota of 250,000 short tons for the pilchard-maasbanker fishery is allocated to commercial fishing companies on the basis of their annual intake of raw fish. Four companies have an annual allotment of 45,000 tons each, and these same companies are able to process 30 tons of fish an hour for the production of fish meal. Two other companies have an annual quota of 35,000 tons each and are able to process 20 tons of fish an hour for fish meal.

The 1956 pilchard-maasbanker fishery season in South-West Africa will be changed, reports a November 28, 1955, United States consular dispatch from Cape Town. The season formerly was from February 1 until November 30, provided the quota of 250,000 tons had been caught, and if the quota had not been caught, fishing continued until the quota had been reached. Effective January 1, 1956, fishing in South-West Africa will not begin until March 1 and will continue until November 30 or until such time as the fishing quota is attained.



Thailand

SHRIMP FISHERIES: The Thai shrimp fishery at present is confined to shore and estuaries of the Gulf of Siam and to Lagoons bordering the Gulf. One recently-started Japanese-type bull-trawl operation catches shrimp in offshore areas of the Gulf; this operation being incidental to other fishing.

While shrimp fishing is scattered extensively throughout the coast, principal fishing areas at present are: (a) off the mouth of the Menam Chao Phya; and (b) at Songkhla within the Inland Sea (Thale Luang) and its outlet to the Gulf.

The Chao Phya fishery is conducted during the dry season--February to June or July by approximately 100 small boats of no regular type (sampans and other small craft many of which are powered by semi-Diesel or Diesel engines). Each of these boats employ one or two small locally-made beam trawls, reports the United States Embassy at Bangkok in a December 7 dispatch.

The Songkhla fishing is carried on throughout the year by cast nets, beach seining, and traps. No trawls are used.

There are no canneries engaged in packing shrimp, but shrimp drying and shrimp-paste manufacture is important and very widespread. Although freezer space is available, no shrimp are frozen and there is no commerce in this product. Shrimp-flavored chips (Krupoek) are manufactured in considerable quantity for local use.

There are no reliable data on which to base production figures, but it is believed that the total catch (all types of shrimp for all purposes) is at least 44 million pounds annually with production definitely increasing.

Many species make up the commercial catches. For shrimp paste, very small types (Acetes sp.) almost planktonic in size are used. The largest shrimp, a Pen-
eid type, runs 4 or 5 per pound heads on. In between are other species of varying sizes.

No official figures are available concerning export movements of shrimp or shrimp products. Fresh or iced shipments are very small and are made only occasionally to Malaya from areas near that territory. No frozen shrimp and no

canned shrimp is produced or exported. Exports of dried shrimp are made to neighboring countries and to Hong Kong. The quantity of such exports being estimated at 1.1 million pounds a year. There are probably small exports of shrimp paste (Kapi) to countries bordering on Thailand.



Union of South Africa

FISHERY TRENDS, OCTOBER-NOVEMBER 1955: Production of fish in South African waters was disappointing in October and November 1955 and the pack of canned fish (which enjoys a firm market overseas) has been low. According to a Cape Town fishery firm, catch of pilchards is still about 13,000 short tons below the annual quota of 250,000 tons for the Union of South Africa.

It is understood that the output of fish meal and fish oil in the Union of South Africa also has been affected by poor fishing. Only a limited amount of fish meal has been sold on overseas markets, and at high prices.

The production of spiny lobster, however, has been considered satisfactory by the local trade, but with a strong overseas demand for canned and frozen packs, stocks of this commodity held by local fishing companies reportedly remain low.



Venezuela

JAPANESE TUNA LONG-LINER STARTS FISHING: The Venezuelan-Japanese company tuna long-liner Bozo Maru operated by the Japanese started fishing on December 14, 1955, according to Nippon Suisan Shimbun, a Japanese trade publication. The United States Embassy at Caracas reported on November 8, 1955, that the Bozo Maru would operate off the Island of La Blanquilla.



Editorial Assistant--Ruth V. Keefe

Illustrator--Gustaf T. Sundstrom

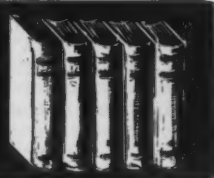
Compositors--Jean Zalevsky, Alma Greene, and Helen Joswick

Photograph Credits: Page by page, the following list gives the source or photographer for each photograph in this issue. Photographs on pages not mentioned were obtained from the Service's file and the photographers are unknown.

Pages 5 and 6--J. A. Dassow; p. 37--F. B. Walker & Sons, Pascagoula, Miss.; Meletio Seafood Co., St. Louis, Mo.; and p. 55--Robert Capa.



FEDERAL ACTIONS



Federal Trade Commission

FROZEN FOOD INDUSTRY TRADE PRACTICE RULES:

Trade practice rules for the frozen food industry were issued January 13, 1956, by the Federal Trade Commission under the trade practice conference procedure. These rules become operative 30 days after date of issue.

The industry for which trade practice rules are hereby established is composed of persons, firms, corporations,



and organizations engaged in the production and/or marketing of vegetables, fruits, juices, fish and shellfish, baked goods, and other miscellaneous prepared foods, which are packed, marketed, and delivered to the ultimate consumer in a frozen state. Not included as products of the industry are meats and poultry, and frozen dairy products including ice cream and sherbets.

With respect to products of the industry as above defined, the rules for this industry supersede those promulgated for the Grocery Industry on March 18, 1952.

The rules are directed to the maintenance of free and fair competition in the industry and to the prevention and elimination of various practices deemed to be violative of laws administered by the Commission. They are to be applied to such end and to the exclusion of any acts or practices which suppress competition or otherwise restrain trade.

Proceedings under which the rules have been established were instituted upon application from members of the industry. A general trade practice conference was held in the offices of the Commission in Washington, D. C., at which proposals for rules were submitted for consideration of the Commission. Thereafter, proposed rules were published by the Commission and made available to all industry members and other interested or affected parties upon public notice whereby they were afforded opportunity to present their views, including such pertinent information, suggestions, or amendments as they desired to offer, and to be heard in the premises. Pursuant to such notice, a public hearing was held in Washington, D. C., on September 8, 1955, and all matters there presented, or otherwise received in the proceeding, were duly considered by the Commission.

Thereafter, and upon full consideration of the entire matter, final action was taken by the Commission whereby it approved and received respectively, the Group I and Group II rules. The Group II rules are not of the type presently the subject of a general study by the Commission.

The rules are divided into two groups. Group I rules embrace unfair methods of competition, unfair or deceptive acts or practices, or other illegal practices, prohibited under laws administered by the Federal Trade Commission; and appropriate proceedings in the public interest will be taken by the Commission to prevent the use, by any person, partnership, corporation, or other organization subject to its jurisdiction, of such unlawful practices in commerce. Specific rules include prohibited discrimination; exclusive deals; prohibited sales below cost; push money; fictitious prices;

false invoicing, billing, etc.; coercing the purchase of one product as a prerequisite to the purchase of other products; misrepresentation in general; defamation of competitors or false disparagement of their products; enticing away employees of competitors; substitution of products; inducing breach of contract; use of lottery schemes, etc.; prohibited forms of trade restraints (unlawful price fixing, etc.); use of the word "free"; misrepresenting products as conforming to standard; procurement of competitors' confidential information; and aiding or abetting use of unfair trade practices.

Group II rules include contractual obligations and proper refrigeration and although their violation does not per se constitute violation of law, correction proceedings in respect thereto may be instituted by the Commission.

Copies of Trade Practice Rules for the Frozen Food Industry are available upon request from the Federal Trade Commission, Washington 25, D. C.



Tariff Commission

INVESTIGATION OF INJURY TO DOMESTIC PRODUCERS BY GROUND FISH FILLET IMPORTS:

Upon application made January 12, 1956, by the Massachusetts Fisheries Association, Inc., and others, the United States Tariff Commission, on January 16, 1956, under the authority of section 7 of the Trade Agreements Extension Act of 1951, as amended, and section 332 of the Tariff Act of 1930, instituted an investigation to determine whether the products described below are, as a result, in whole or in part, of the duty or other customs treatment reflecting concessions granted on such products under the General Agreement on Tariffs and Trade, being imported into the United States in such increased quantities, either actual or relative, as to cause or threaten serious injury to the domestic industry producing like or directly-competitive products.

Tariff Act of 1930 Par. 717(b)

Description of Product

Cod, haddock, hake, pollock, cusk, and rosefish, fresh or frozen (whether or not packed in ice), all the foregoing, filleted, skinned, boned, sliced, or divided into portions.



Eighty-Fourth Congress (Second Session)

Listed below are public bills and resolutions that directly or indirectly affect the fisheries and allied industries. Public bills and resolutions are shown when introduced; from month to month the more pertinent reports, hearings, or chamber actions on the bills shown are published; and if passed, they are shown when signed by the President.



OPENING OF SECOND SESSION: The Second Session of the 84th Congress commenced on January 3, 1956.

COMMERCIAL FISHERIES NATIONAL POLICY: H. R. 8001 (Wilson of California) introduced in House January 3. A bill to establish a national policy with respect to commercial fisheries; to establish the office of Assistant Secretary of Commerce for Commercial Fisheries, and define his functions, powers, and responsibilities; to strengthen the commercial fisheries segment of the national economy; and for other purposes; to the Committee on Merchant Marine and Fisheries.

This bill provides for an additional Assistant Secretary of Commerce to exercise all functions with respect to commercial fisheries prescribed by this bill or transferred to him, under the general supervision and control of the Secretary of Commerce.

"... SEC. 3, (a) Those portions of the Fish and Wildlife Service of the Department of the Interior having to do with biological, oceanographic, meteorological, technological, economic and other scientific investigations, conservation management, foreign activities, and economic activities, as all of these portions relate to the commercial fisheries, and their functions, are hereby transferred to the Assistant Secretary.

"(b) All records, property, personnel, commitments, and unexpended balances (available or to be made available) of appropriations, allocations, and other funds as the Director of the Bureau of the Budget shall determine to relate primarily to the functions transferred by subsection (a) shall be transferred to the Assistant Secretary.

"SEC. 4. With a view to keeping the commercial fisheries industry and the Government informed, the Assistant Secretary shall conduct continuing studies, and periodically report on, the following:

"(1) Production and flow to market of domestically produced fishery commodities;

"(2) Production and flow to market of foreign produced fishery commodities, as they affect the domestic commercial fisheries;

"(3) Trends in production of fishery commodities;

"(4) Measures appropriate to maximize the sustainable production of fishery commodities and minimize wide fluctuations therein; and

"(5) The competitive economic position of the several fishery commodities with respect to each other, to competitive foreign-produced fishery commodities, and to other competitive commodities.

"SEC. 5. (a) The Secretary shall establish, operate, and maintain a program of loans for construction or reconstruction of fishing vessels, and for operating capital and facilities loans needed by fishermen's associations or cooperatives. He shall also establish, operate, and maintain a program of commodity loans to fishermen's associations or cooperatives, and emergency loans, purchases, and payments with a view to securing to domestic fisheries a fair share of the national income. . . .

"SEC. 6. The Assistant Secretary shall conduct continuing studies, and periodically report, with respect to the following matters:

"(1) Through biological, oceanographic, meteorological, and other scientific research, he shall study and predict the availability of the living resources which support the domestic fishery industry;

"(2) Through market research, he shall study, predict, and report on marketing conditions insofar as they affect the domestic fishery industry; and

"(3) Through such means as he determines to be feasible he shall study, and report on the prospective availability to the market of products produced by the domestic fishery industry.

"Whenever the Assistant Secretary determines that there is a prospective or actual oversupply of any product or products produced by the domestic fishery industry, he shall engage in promotional and informational activities with a view to stimulating the consumption of such products.

"SEC. 7. (a) Whenever the Assistant Secretary has reason to believe that any product or products are being or are practically certain to be imported into the United States under such conditions and in such quantities as to render or tend to render ineffective, or materially interfere with, his operations under section 5, or to reduce substantially the amount of any product processed in the United States from any product produced by domestic commercial fisheries, he shall so advise the President. If the President agrees that there is reason for such belief, he shall cause an immediate investigation to be made by the United States Tariff Commission which shall give precedence to investigations to determine such facts. Such investigations shall be made after

due notice and opportunity for hearing to interested parties, and shall be subject to such regulations as the President shall specify.

"(b) If, on the basis of such investigation and report to him findings and recommendations made in connection therewith, the President finds the existence of such facts, he shall by proclamation impose such fees not in excess of 50 per centum ad valorem or such quantitative limitations on any article or articles which may be entered or withdrawn from warehouse, for consumption as he finds and declares shown by such investigation to be necessary in order that the entry of such article or articles will not render or tend to render ineffective, or materially interfere with, any program or operation referred to in section 5, or reduce substantially the amount of any product processed in the United States from any product produced by domestic commercial fisheries. In designating any article or articles, the President may describe them by physical qualities, value, use, or upon such other bases as he shall determine.

"(c) After investigation, report, finding, and declaration in the manner provided in the case of a proclamation issued pursuant to subsection (b) of this section, any proclamation or provision of such proclamation may be suspended or terminated by the President whenever he finds and proclaims that the circumstances requiring the proclamation or provision thereof no longer exist or may be modified by the President whenever he finds and proclaims that changed circumstances require such modification to carry out the purposes of this section.

"(d) Any decision of the President as to facts under this section shall be final.

"(e) No trade agreement or other international agreement heretofore or hereafter entered into by the United States shall be applied in a manner inconsistent with the requirements of this section.

"SEC. 8. (a) The Assistant Secretary shall periodically prepare and disseminate to the public information relating to market conditions, production, and economics of fisheries in the principal fishing countries.

"(b) The Assistant Secretary shall cooperate with the Secretary of State in providing representation of the United States on International Fisheries Commissions and at International Fisheries Conferences.

"(c) The Assistant Secretary shall advise and consult with the Secretary of State and with other officers of the United States having responsibilities in the fields of providing economic and technical aid to foreign nations, with a view to providing coordination in programs of such aid insofar as such programs affect the interests of domestic commercial fisheries. The Assistant Secretary shall be represented in all international negotiations conducted by the United States pursuant to section 350 of the Tariff Act of 1930, insofar as such negotiations directly affect domestic commercial fisheries."

Also: introduced January 9: H. R. 8249 (Curtis of Mass.), H. R. 8285 (Teague of Calif.), and H. R. 8288 (Utt); January 12: H. R. 8360 (Hosmer), H. R. 8363 (Johnson of Calif.), H. R. 8368 (Kilgore), H. R. 8375 (Lipscomb), H. R. 8378 (McDonough), and H. R. 8386 (Phillips). January 16: H. R. 8455 (Bell), H. R. 8466 (Hale), H. R. 8478 (Lane), H. R. 8498 (Thompson of Texas), H. R. 8503 (Younger); January 17: H. R. 8536 (Farrington); introduced January 18: H. R. 8589

(Doyle) and H. R. 8590 (Fogarty); January 19; H. R. 8624 (Dorn); January 23; H. R. 8706 (Roosevelt)--all introduced in the House on the dates indicated, all similar to H. R. 8001 (Wilson of Calif.), and all referred to the Committee on Merchant Marine and Fisheries.

FAIR LABOR STANDARDS ACT AMENDMENT: H. R. 8553 (Roosevelt) introduced in House January 17. A bill to amend the Fair Labor Standards Act of 1938, as amended, to provide greater coverage for employees of food industries whose activities affect interstate commerce, and for other purposes; to the Committee on Education and Labor.

FOOD ADDITIVES: H. R. 8271 (O'Hara of Minn.) introduced in the House January 9. A bill to amend the Federal Food, Drug, and Cosmetic Act for the protection of the public health, by prohibiting new food additives which have not been adequately pretested to establish their safe use under the conditions of their intended use; to the Committee on Interstate and Foreign Commerce.

Also: H. R. 8275 (Priest) introduced in the House on the same date and similar to H. R. 8271.

IMPORT QUOTAS: H. R. 7929 (Lanham of Georgia) introduced in House January 3. A bill to regulate the foreign commerce of the United States by establishing import quotas under specified conditions, and for other purposes; to the Committee on Ways and Means.

Also: introduced January 5; H. R. 8099 (Bailey) and H. R. 8131 (Hays); January 12; H. R. 8326 (Byrd) and H. R. 8383 (Nelson)--all introduced in the House on the dates indicated and referred to the Committee on Ways and Means, and all similar to H. R. 7929 (Lanham of Georgia).

TARIFF COMMISSION INVESTIGATION OF FROZEN ALBACORE TUNA IMPORTS: S. Res. 186 (Kuchel and Magnuson) introduced in the Senate January 17. Resolved, that the United States Tariff Commission make an investigation, as provided for in section 7 (b) of the Trade Agreements Extension Act of 1951, to determine whether, as a result of the concession made to Japan, in a trade agreement entered into on June 7, 1955, binding the duty-free treatment of fresh and frozen albacore tuna, this product is being imported in the United States in such increased quantities, either actual or relative, as to cause or threaten serious injury to the domestic industry producing like or directly competitive products; to the Committee on Finance.

Also: introduced in the House January 18; H. Res. 377 (King of Calif.) and H. Res. 378 (Farrington); referred to the Committee on Ways and Means--all similar to S. Res. 186 (Kuchel and Magnuson).

WATER POLLUTION: H. R. 8108 (Broyhill) introduced in the House January 5. A bill to provide for the development of a comprehensive master plan to abate and prevent water pollution in the District of Columbia and areas immediately adjacent thereto, and for other purposes; to the Committee on Public Works.



CANNED FISH FOR LENT

There will be plenty of canned fish and shellfish during Lent, the U. S. Fish and Wildlife Service assured housewives on February 1.

Supplies of canned fish and shellfish are well distributed throughout the country and include tuna, salmon, sardines, shrimp, crab, and oysters.

Canned tuna is on the United States Department of Agriculture Plentiful Foods List for February and March. It is relatively low in cost, and is available in a wide variety of styles of pack.

For a cold-weather casserole that the whole family will love, the home economists of the Fish and Wildlife Service suggest this recipe.

TUNA CASSEROLE WITH TOASTED ALMOND SAUCE

2 cans (6½ or 7 ounces each) tuna	Dash pepper
2 packages (10 ounces each) frozen asparagus	Dash nutmeg
½ cup chopped blanched almonds	2 cups milk
¼ cup butter or other fat, melted	1 tablespoon sherry
¼ cup flour	(optional)
½ teaspoon salt	Paprika

Drain and flake tuna. Cook asparagus as directed on package. Arrange in the bottom of a well-greased baking pan, 11 x 7 x 1½ inches. Place tuna in a layer over asparagus. Fry almonds in butter until lightly brown. Blend in flour and seasonings. Add milk gradually and cook until thick, stirring constantly. Add sherry. Pour over tuna and asparagus. Sprinkle with paprika. Bake in a moderate oven, 350° F., for 25 to 30 minutes. Serves 6.

FISHERY INDICATORS

CHART 1 - FISHERY LANDINGS for SELECTED STATES

In Millions of Pounds

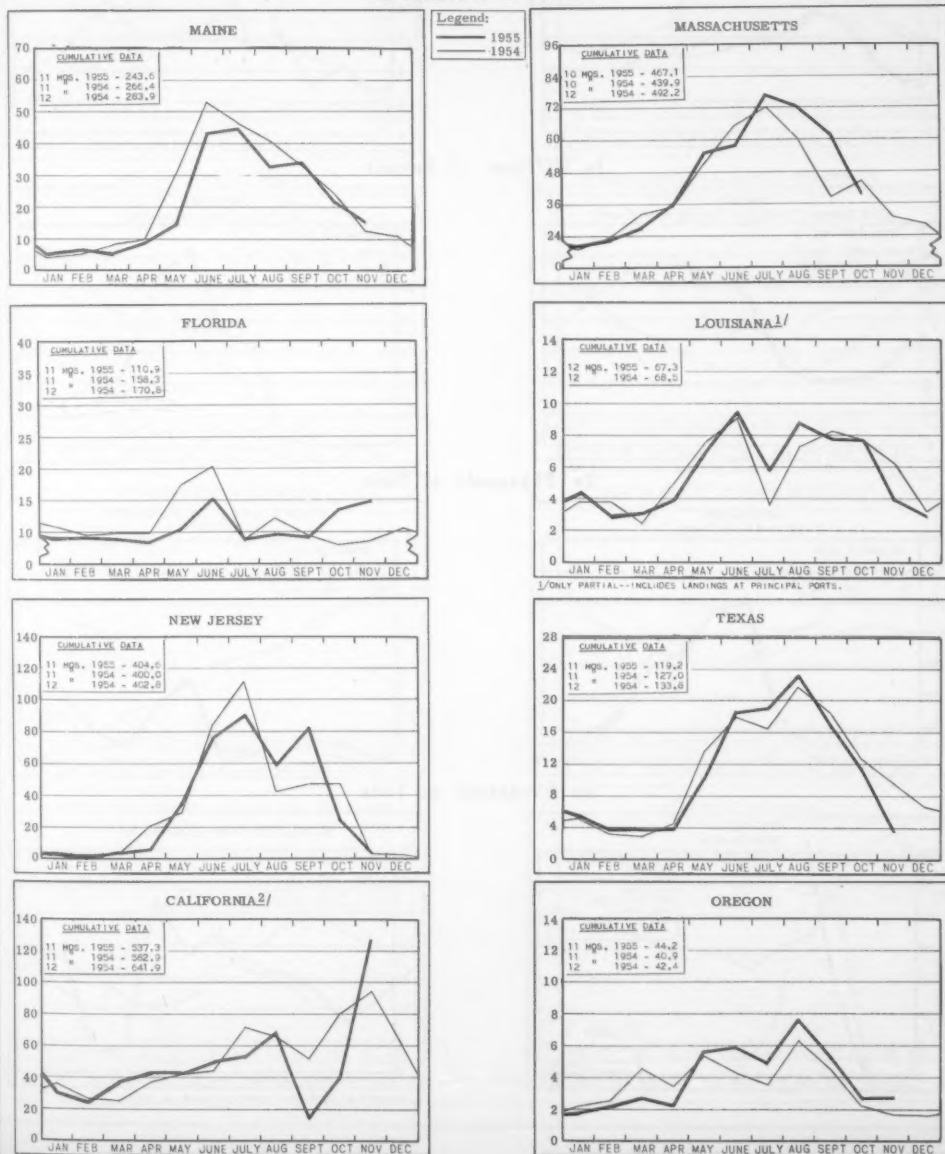
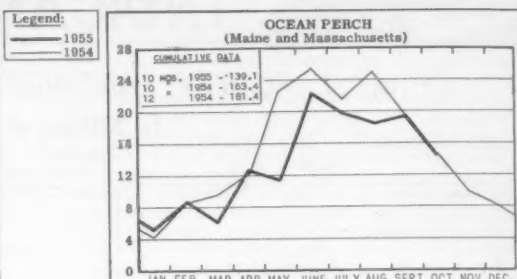
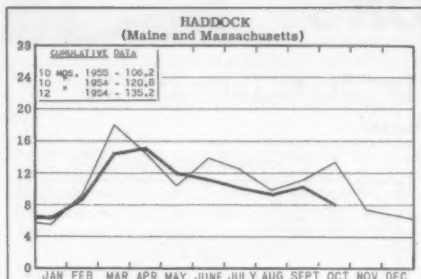
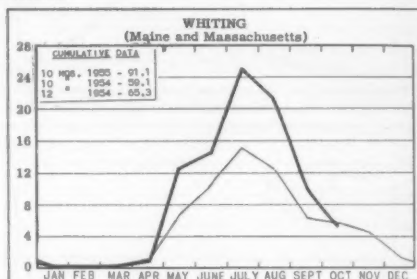
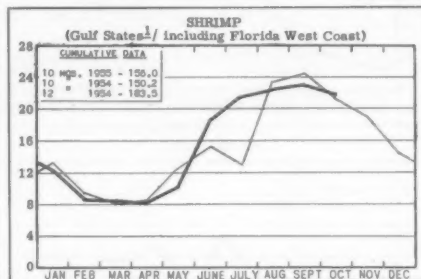


CHART 2 - LANDINGS for SELECTED FISHERIES

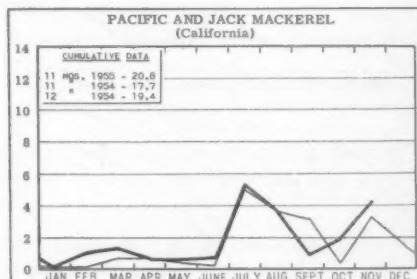
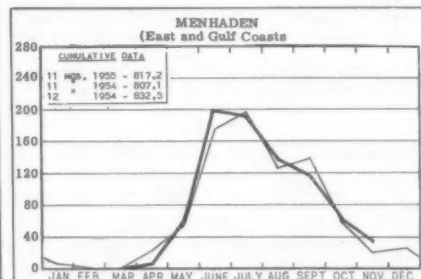
In Millions of Pounds



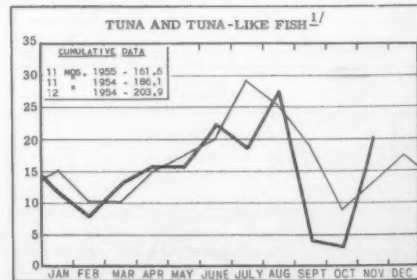
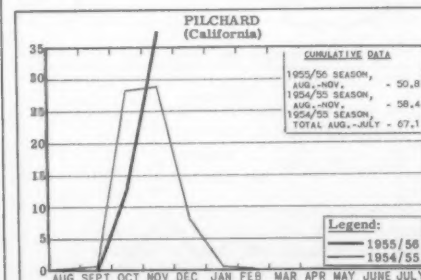
In Millions of Pounds



In Thousands of Tons



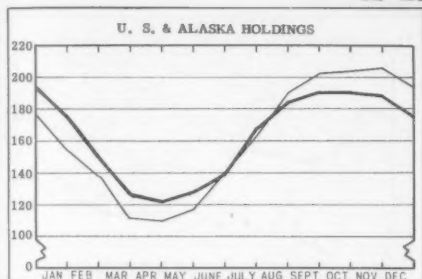
In Thousands of Tons



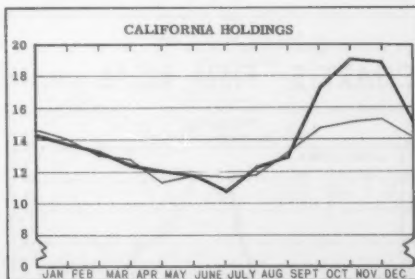
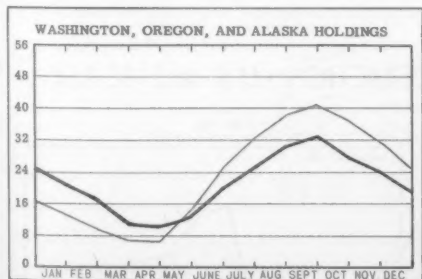
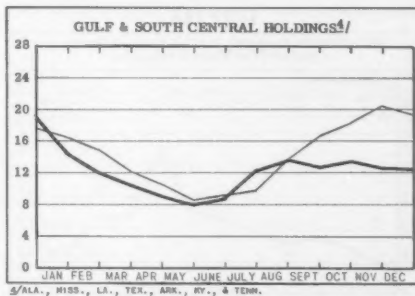
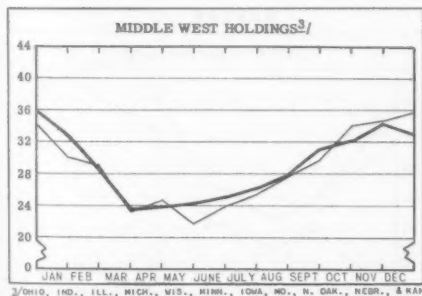
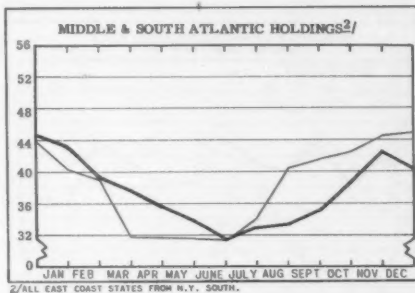
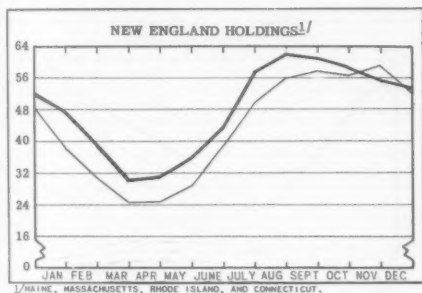
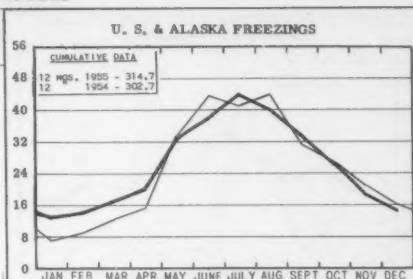
^{1/} RECEIPTS BY CALIFORNIA CANNERIES, INCLUDING IMPORTS.

CHART 3 - COLD-STORAGE HOLDINGS and FREEZINGS of FISHERY PRODUCTS *

In Millions of Pounds



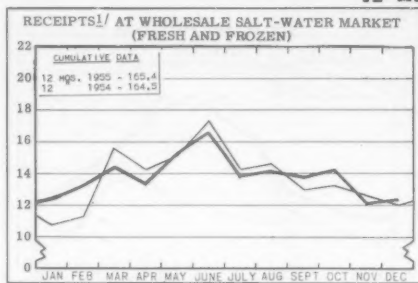
Legend:
— 1955
--- 1954



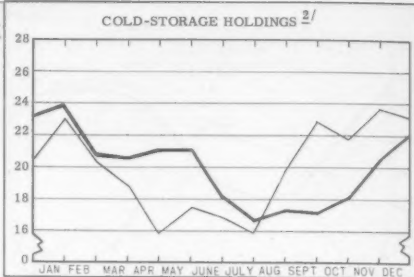
*Excludes salted, cured, and smoked products.

CHART 4 - RECEIPTS and COLD-STORAGE HOLDINGS of FISHERY PRODUCTS at PRINCIPAL DISTRIBUTION CENTERS

In Millions of Pounds

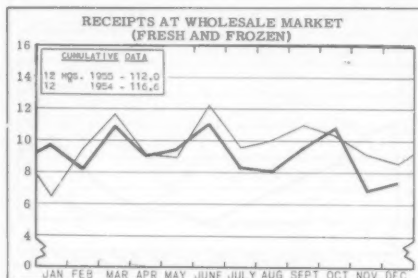


NEW YORK CITY

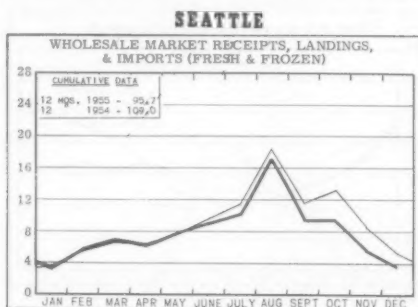
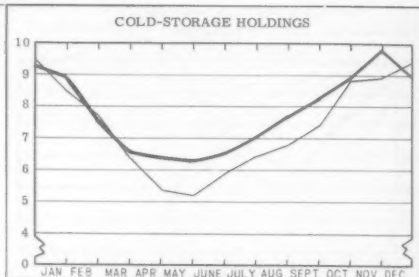


^{1/}INCLUDE TRUCK AND RAIL IMPORTS FROM CANADA AND DIRECT VESSEL LANDINGS AT NEW YORK CITY.

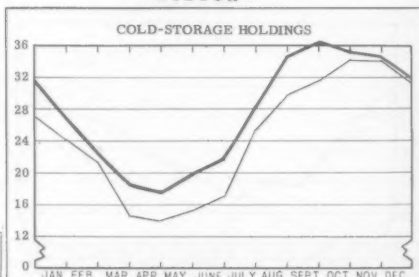
^{2/}AS REPORTED BY PLANTS IN METROPOLITAN AREA.



CHICAGO



BOSTON



Legend:
— 1955
- - 1954

CHART 5 - FISH MEAL and OIL PRODUCTION - U.S and ALASKA

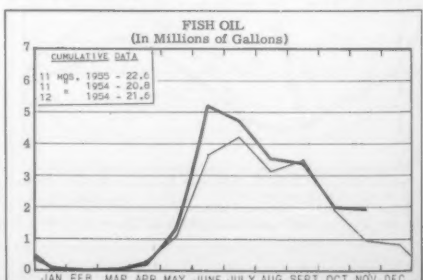
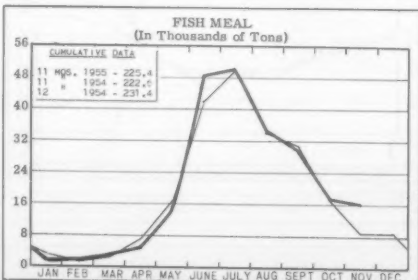
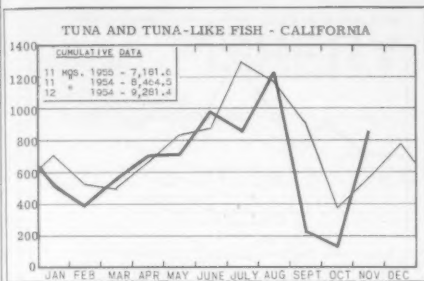


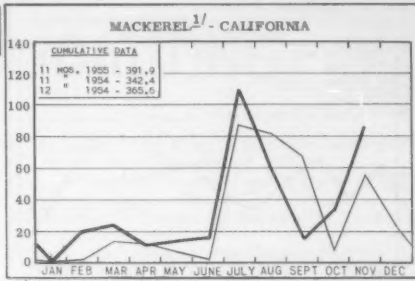
CHART 6 - CANNED PACKS of SELECTED FISHERY PRODUCTS

In Thousands of Standard Cases

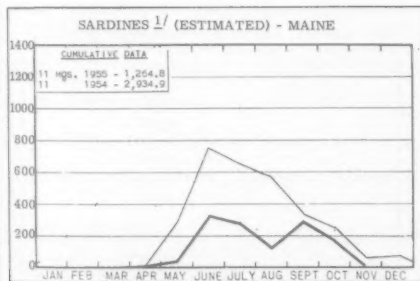
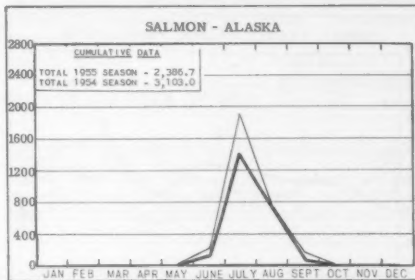
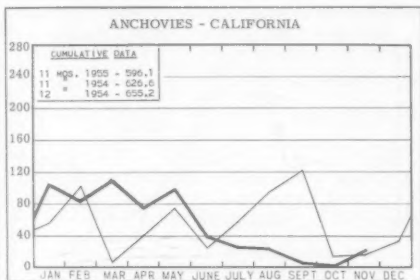


Legend:

— 1955
- - 1954



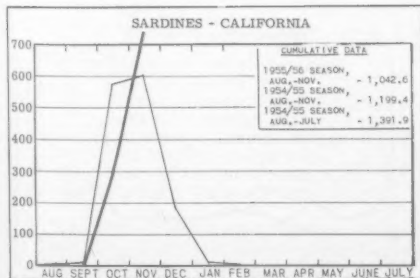
^{1/} INCLUDES PACIFIC MACKEREL AND JACK MACKEREL.



^{1/} INCLUDING SEA HERRING.

STANDARD CASES

Variety	No. Cans	Can Designation	Net Wgt.
SARDINES	100	$\frac{1}{2}$ drawn	3 $\frac{1}{2}$ oz.
SHRIMP	48	--	5 oz.
TUNA	48	No. $\frac{1}{2}$ tuna	6 & 7 oz.
PILCHARDS	48	No. 1 oval	15 oz.
SALMON	48	1-pound tall	16 oz.
ANCHOVIES	48	$\frac{1}{2}$ lb.	8 oz.



Legend:

— 1955/56
- - 1954/55

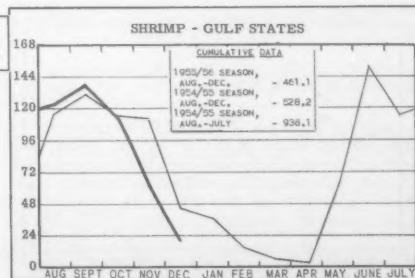
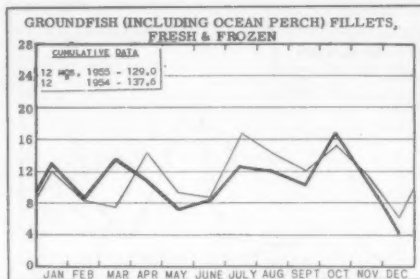
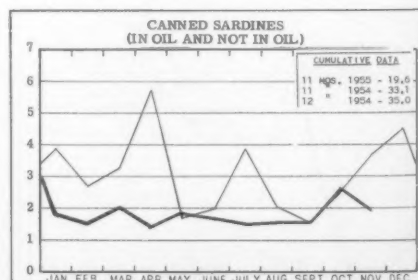
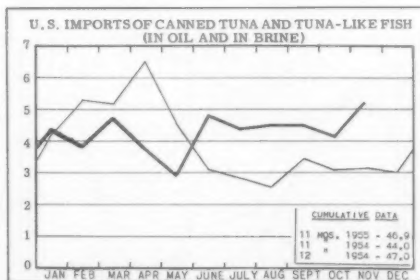
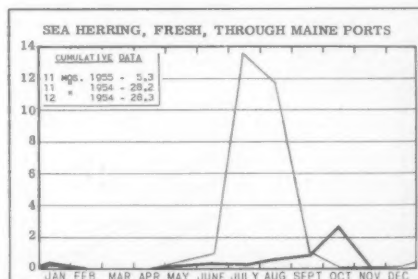
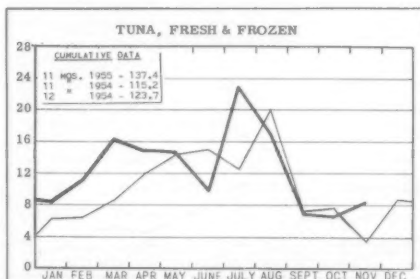
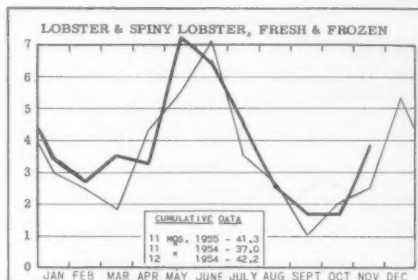
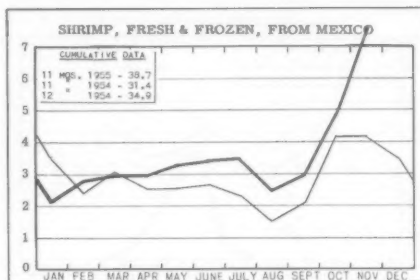
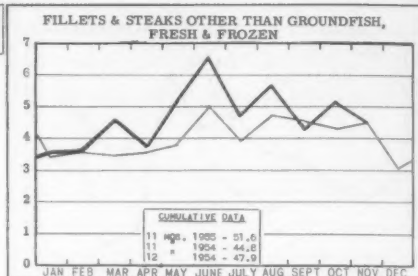


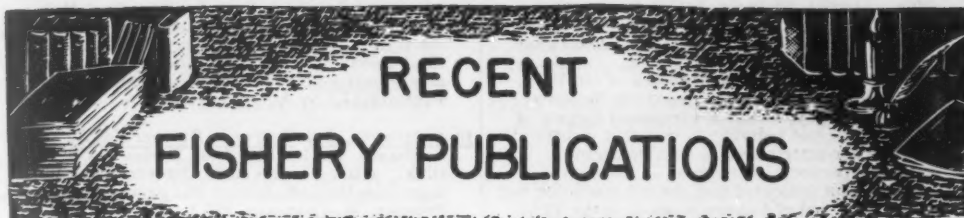
CHART 7 - U.S. FISHERY PRODUCTS IMPORTS

In Millions of Pounds



Legend:
— 1955
--- 1954





RECENT FISHERY PUBLICATIONS

FISH AND WILDLIFE SERVICE PUBLICATIONS

THESE PROCESSED PUBLICATIONS ARE AVAILABLE FREE FROM THE DIVISION OF INFORMATION, U. S. FISH AND WILDLIFE SERVICE, WASHINGTON 25, D. C. TYPES OF PUBLICATIONS ARE DESIGNATED AS FOLLOWS:

- CFS - CURRENT FISHERY STATISTICS OF THE UNITED STATES AND ALASKA.
- SL - STATISTICAL SECTION LISTS OF DEALERS IN AND PRODUCERS OF FISHERY PRODUCTS AND BYPRODUCTS.
- MDL - MARKET DEVELOPMENT LISTS.
- SSR - FISH, - SPECIAL SCIENTIFIC REPORTS--FISHERIES (LIMITED DISTRIBUTION).
- SEP. - SEPARATES (REPRINTS) FROM COMMERCIAL FISHERIES REVIEW.

Number	Title
CFS-1186	- California Landings - May 1955, 4 pp.
CFS-1215	- New York Landings - August 1955, 4 pp.
CFS-1216	- Frozen Fish Report - September 1955, 8 pp.
CFS-1218	- Fisheries of the United States and Alaska, 12 pp.
CFS-1221	- Rhode Island Landings - August 1955, 3 pp.
CFS-1223	- Fish Stick Report - July-Sept., 2 pp.
CFS-1224	- Florida Landings - August 1955, 6 pp.
CFS-1227	- Alabama Landings - August 1955, 2 pp.
CFS-1231	- Mississippi Landings - August 1955, 2 pp.
CFS-1232	- Fish Meal and Oil - September 1955, 2 pp.
CFS-1234	- Manufactured Fishery Products - 1953, 7 pp.
CFS-1226	- New York Landings - September 1955, 5 pp.

Wholesale Dealers in Fishery Products (Revised):

- SL - 21 - California-1955, 11 pp.
- SL - 27 - Indiana-1955, 1 p.
- SL - 30 - Pennsylvania-1955 (Lake Erie) 1 p.
- SL - 182 - List of Firms Producing Fish Sticks-1954, 2 pp.
- SL - 31 - New York-1955 (Lakes Area), 1 p.

Market Development Lists (Revised):

- MDL-5 - Georgia Locker Plants, 3 pp.
- MDL-33 - Arizona Locker Plants, 2 pp.
- MDL-36 - Arkansas Locker Plants, 3 pp.
- MDL-37 - Connecticut Locker Plants, 2 pp.
- MDL-38 - Delaware Locker Plants, 1 p.
- MDL-39 - Florida Locker Plants, 2 pp.
- MDL-48 - Alabama Locker Plants, 2 pp.

Sep. No. 422 - Construction Details of Improved Tuna Long-Line Gear Used by Pacific Oceanic Fishery Investigations.

Sep. No. 423 - Research in Service Laboratories (December 1955):

- Cold Storage of Frozen Pacific Oysters (*Crassostrea Gigas*) - No. 1.
- Oil Research Project at the Seattle Technological Laboratory.
- Federal Specification for Canned Shrimp.

SSR-Fish. No. 162 - Size Frequencies and Growth of Central and Western Pacific Bigeye Tuna, by Edwin S. Iversen, 146 pp., illus., processed, September 1955.

THE FOLLOWING SERVICE PUBLICATIONS ARE AVAILABLE ONLY FROM THE SPECIFIC OFFICE MENTIONED:

Differences in Intensity of Setting of Oysters and Starfish, by V. L. Loosanoff, J. B. Engle, and C. A. Nomejko, 7 pp., illus., printed. (Reprinted from *Biological Bulletin*, vol. 109, no. 1, pp. 75-81, August 1955.) (Available from U. S. Fish and Wildlife Service, Milford, Conn.)

Production of Fishery Products in Selected Areas of Virginia, Maryland, and North Carolina, 1954 (As Reported to Hampton Fishery Market News Office), by Lester A. Keilman, 18 pp., processed, December 1955. (Available free from the Market News Service, U. S. Fish and Wildlife Service, 18 S. King St., Hampton, Va.) A summary of commercial landings of fish and shellfish and the production of crab meat and shucked oysters as reported by producers and wholesalers from selected principal fishing localities of Virginia, Maryland, and North Carolina. The statistics contained in this annual summary represent the approximate commercial fisheries production only and do not represent complete commercial landings or production for a given area, individual State, or the Chesapeake Bay area as a whole. However, the statistics do give an indication as to the trend in fisheries production for the specific areas designated and do reflect the over-all production trend by species, localities, and by States.

THE FOLLOWING SERVICE PUBLICATIONS ARE FOR SALE AND ARE AVAILABLE ONLY FROM THE SUPERINTENDENT OF DOCUMENTS, WASHINGTON 25, D. C.

Distribution and Food Habits of the Fur Seals of the North Pacific Ocean (Report of Cooperative Investigations by the Governments of Canada, Japan, and the United States of America, Feb.-July 1952), by F. H. C. Taylor, M. Fujinaga, and Ford Wilke, 86 pp., illus., printed, 50 cents, 1955.

Fish and Shellfish Preferences of Household Consumers, by W. H. Stoltz, M. J. Garfield, and D. R. Alexander, Research Report 41, 118 pp.,

illus., printed, 65 cents, 1955. This report is an analysis of a nationwide survey in October 1951 of household consumers' preferences for fresh and frozen fishery products. The survey was conducted under the auspices of the U. S. Fish and Wildlife Service to aid the Nation's fishing industry, which is composed largely of small firms and individuals that find it difficult to make adequate contacts with consumers. Of the 2,473 persons interviewed in the survey, 94.4 percent indicated that their households had used some kind of fishery product in the 12-months period preceding the interview, and only 5.6 percent had used none. Detailed information on the specific likes and dislikes relative to the various fishery products also was obtained.

The Seals, Sea-Lions, and Sea Otter of the Pacific Coast, by Karl W. Kenyon and Victor B. Scheffer, Circular 32, 34 pp., illus., printed, 20 cents, April 1955. Brief identification key (including drawings and photographs) for seals, sea lions, walrus, and sea otter of the Pacific from Mexico to Point Barrow and the Hawaiian Islands.

MISCELLANEOUS PUBLICATIONS

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM. CORRESPONDENCE REGARDING PUBLICATIONS THAT FOLLOW SHOULD BE ADDRESSED TO THE RESPECTIVE ORGANIZATION OR PUBLISHER MENTIONED. DATA ON PRICES, IF READILY AVAILABLE, ARE SHOWN.

"Adson Casey, Commercial Fisherman," article, Michigan Conservation, vol. XXIV, no. 4, July-August 1955, pp. 15-18, illus., printed. Michigan Department of Conservation, Lansing, Mich. Describes and illustrates with a group of pictures the activities of a commercial fisherman in the Great Lakes fisheries.

La Anchoveta y la Harina de Pescado (The Anchovy and Fish Meal), 57 pp., illus., printed in Spanish. Sociedad Nacional de Pesquería, Avenida Wilson 911, Lima, Peru, 1954. One section of this report discusses the fish meal industry of Peru.

Arsmelding 1953 fra Fiskeridirektoratets Kjemisk-Tekniske Forsknings-institutt (Annual Report of the Norwegian Fisheries Research Institute for 1953), by E. Heen, 52 pp., printed in Norwegian. A. S. John Griegs Boktrykkeri, Bergen, Norway, 1955. A summary of the research work carried out at the Norwegian Fisheries Research Laboratory during 1953 covering the following subjects: preservation of herring for reduction purposes by means of NaNO_2 ; packaging materials; fresh and frozen fish; herring products; fish meal; fish oils; and chemical composition of fish and fish products. The report ends with a summary of the work on vitamins and a description of different machines and production methods in the manufacture of meal from herring and other fish.

Australian Journal of Marine and Freshwater Research, vol. 6, no. 3, October 1955, 174 pp., illus., printed, single copy 7s. 6d. (85 U. S. cents). Australian Journal of Marine and Freshwater Research, Commonwealth Scientific and

Industrial Research Organization, East Melbourne, C. 2, Victoria. Includes, among others, the following article: "Underwater Studies on the Tasmanian Commercial Scallop, Notovola meridionalis (Tate) (Lamellibranchiata: Pectinidae)," by A. M. Olsen.

Bremerhaven, Der Führende Fischereihafen (Bremerhaven, the Leading Fish Harbor), 224 pp., illus., printed in German. Internationale Verlags-Gesellschaft, Robert Bargmann (publisher), Bremen, W. Germany, 1953. Deals with the fishing activities at Bremerhaven. Discusses the economic aspects of the fishing industry and fishing enterprise; reconstruction of the Bremerhaven fish harbor; development and duties of the Bremerhaven Port Trust; and Bremerhaven, the most important of German fish harbors; and gives a description and plan of the harbor. Describes the various species of fish landed, and discusses echo sounders, the wholesale handling of coastal fish, marketing, and processing of fish.

Bulletin of the International Oceanographic Foundation, vol. 1, no. 3, November 1955, 65 pp., illus., printed. The Marine Laboratory, University of Miami, Coral Gables, Fla. Includes, among others, the following articles: "Radioactivity in Ocean Science," by T. C. Helvey; "Scripps in the Present Tense," by Thomas A. Manar; "Measuring the Ocean," by Lansing Wagner; "Set a Fish to Catch a Fish."

Les Crustacés Comestibles des Mers Tunisiennes et Leur Pêche (The Crustaceans of the Tunisian Waters and Their Fisheries), by Henri Heldt and Jeanne H. Heldt, Annales No. IX, 26 pp., illus., printed in French. Station Oceanographique de Salammbô, Tunis, Tunisia, March 1954. The purpose of this report is to indicate the species of edible crustaceans which are found in Tunisian waters, furnish some basic data on their biology, indicate the type of bottom where they are found, and the types of gear used to catch them.

Enlatado, Curado y Otros Metodos de Preservacion del Pescado y Elaboracion de Sub-productos (Canning, Curing and Other Methods of Fish Preservation and Utilization of Byproducts), by A. Lopez Matas, 182 pp., illus., printed in Spanish. Food and Agriculture Organization of the United Nations, Rome, Italy, 1954. Contains the text of lectures on fisheries technology given at the First FAO Latin American Fisheries Training Center in Valparaiso, Chile, in 1952. The booklet is divided into two parts and the following chapters: Part I--(1) Historical Outline and Basic Principles; (2) Spoilage of Canned Food; (3) Sterilization of Canned Foods; (4) Fish Canning; (5) Operations Involved in Canning of Fish; (6) Containers and Packages; (7) Fish Canning Machinery; (8) Canning Methods; (9) Canning of Shellfish; (10) Special Canned Products; (11) Products Packed in Hermetically Sealed Containers without Sterilization; (12) Analysis and Inspection of Canned Fisheries Products; (13) Nutritive Value of Canned Fisheries Products; (14) Products from Dried Fish; (15) Drying of Fish without Salting; (16) Salting of Fish; (17) Brined and Pickled Fish; (18) Smoking of Fish; (19) Caviar and Other Products from Fish Roe; and (20) Products from Fermented Fish.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATIONS ISSUING THEM.

Part II--(1) Production of Fish Meal and Oil; (2) Fish Oils; (3) Fish Liver Oils; (4) Production of Albumen from Fish; (5) Manufacture of Adhesives from Fish; and (6) Products from Seaweeds.

(FAO) Bacterial Fish Spoilage and its Control, by Ernest Hess, FAO Fisheries Papers No. 4, 11 pp., processed. (Reprinted from Food Technology, vol. IV, no. 12, pp. 477-480, 1950.) Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, May 1955.

(FAO) Economic Influence on Design of Fishing Craft, by C. Beever, FAO Fisheries Papers No. 3, 8 pp., processed. (Reprinted from Fishing Boats of the World, Fishing News, Arthur Heighway Publications Limited, Ludgate House, 110 Fleet St., London E. C. 4) Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, April 1955.

(FAO) Fishing Boat Tank Tests, Part I, compiled by Jan-Olof Traung, 168 pp., illus., processed. Food and Agriculture Organization of the United Nations, Rome, Italy, November 1955. A catalogue of fishing-boat tank-test results intended for naval architects to enable them to predict, with few calculations, the required power for new designs and, at the same time, allow them to study influence of varying proportions, coefficients, etc., upon resistance and power requirements. At the 1953 FAO International Fishing Boat Congress a paper entitled "Outline to a Catalogue of Fishing Boat Tank Tests" was presented in which the results from a number of resistance tests were given. The general opinion of the participants at the Congress was that a continued publication of such fishing-boat tank-test results would be a useful service to naval architects. The "Outline" catalogue contained 46 data sheets. The first part of the present catalogue contains an additional 104 sheets, and it is presented in looseleaf form so that additional sheets may be added at any time. The data sheets cover models with both high and low specific resistance and a wide variety of types.

(FAO) The Food Technologist and the World Food Crises, by Mogens Jul, FAO Fisheries Papers No. 5, 10 pp., processed. (Reprinted from Food Technology, vol. 3, no. 9, pp. 279-283, 1949.) Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, May 1955.

(FAO) Improving the Fisheries Contribution to World Food Supplies, FAO Fisheries Papers No. 1, 25 pp., illus., printed. (Reprinted from FAO Fisheries Bulletin, vol. VI, no. 5, Sept.-Oct. 1953) Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, April 1955.

(FAO) Index to FAO Fisheries Bulletin Vol. VII, 4 pp., printed. (Reprinted from FAO Fisheries Bulletin, vol. VII, no. 4, October-December

1954.) Food and Agriculture Organization of the United Nations, Rome, Italy.

(FAO) Lists of (A) Manufacturers of Nylon Yarn and Other Artificial Fibers; (B) Manufacturers and/or Suppliers of Nets, Nettings and Twines made of Nylon or Other Synthetic Fibers; and (C) Manufacturers and/or Suppliers of Fishing Lines made of Nylon or Other Synthetic Fiber Materials, FAO/55/11/7294, 14 pp., processed. Food and Agriculture Organization of the United Nations, Rome, Italy, November 1955.

(FAO) A Note on the Fisheries Resources of the North West Atlantic, by G. L. Kesteven and S. J. Holt, FAO Fisheries Papers No. 7, 12 pp., illus., processed. A paper submitted at the Fifth (1955) Session of the International Commission for the Northwest Atlantic. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, June 1955.

(FAO) The Problem of the Introduction of Foreign Species into Inland Waters--Both Natural and Cultivated Species, FAO Fisheries Papers No. 2, 12 pp., processed. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, March 1955. Combines three papers entitled "Some Notes on the Principles of Inland Fisheries Management and Development, with Special Reference to the Problem of Introduction;" "Notes on the Freshwater Fish Fauna of Middle Central America, with Especial Reference to Pond Culture of Tilapia," by George S. Myers; and "Destroying a Myth."

(FAO) Report to the Government of Pakistan on the Mechanization of West Pakistan Fishing Boats, FAO Report No. 403, 128 pp., illus., processed. Food and Agriculture Organization of the United Nations, Rome, Italy, September 1955. It is generally agreed that West Pakistan fishing boats were well built and manned by enterprising fishermen who go far out to sea and land good catches. However, it was questioned by the Pakistan government whether or not certain European or American fishing boats were more efficient than those used in Pakistan. A survey made by FAO's naval architect in 1951 indicated that the Pakistan boats were of an unusually advanced design, complying with modern laws of naval architecture, and it was felt that the mere introduction of boats from abroad would not necessarily result in a more efficient fleet than could be obtained by mechanizing the local boat types and modifying them slightly, so as to make them more suitable for fishing with modern gear and methods. This report includes general observations on West Pakistan fishing boats and discussions of the mechanization of available boats and construction of new boats. It also includes a reprint of the article entitled "West Pakistan Fishing Craft," by M. Rahimullah Qureshi, Henry Magnusson, and Jan-Olof Traung; and "A Note on Financial Assistance Schemes for the Purchase and Improvement of Fishing Craft," by C. Beever, FAO Fisheries Economist.

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

(FAO) Some Basic Economic Problems of Fishery Development in South and East Asia, FAO Fisheries Papers No. 6, 12 pp., illus., processed. Discusses problems of fishery expansion and fish marketing. Based on papers presented at the FAO Regional Consultation on the Selective Expansion of Agricultural Production and Consumption, Ceylon, June 20-25, 1955. Food and Agriculture Organization of the United Nations, Viale delle Terme di Caracalla, Rome, Italy, June 1955.

(FAO) Yearbook of Fishery Statistics, 1952-53 (Annuaire Statistique des Pêches, Anuario Estadístico de Pesca), vol. IV, Part 1, 1954 Supplement, 76 pp., processed, in English and French with table of contents and introduction in Spanish. Food and Agriculture Organization of the United Nations, Rome, Italy, 1955. This 1954 Supplement brings up to date Section I (Catch and Landings) of Volume IV, Part I of the Yearbook of Fishery Statistics, except for table 2 and tables 16-19. Since the issue of the Yearbook, 1954 landing statistics have been received from many countries including most of the principal producers (among them, for the first time, the U.S.S.R.), as well as revisions of earlier data, particularly for the year 1953. The supplement contains summaries of catch and landings of fishery products, and quantity and value of landings by countries and by species for 1938, 1947-54.

(FAO) Yearbook of Fishery Statistics, 1952-53 (Annuaire Statistique des Pêches, Anuario Estadístico de Pesca), vol. IV, Part 2 (International Trade; Commerce International: Comercio Internacional), 342 pp., printed in English and French with introduction, table of contents, and general notes in Spanish, US\$3. Food and Agriculture Organization of the United Nations, Rome, Italy, 1955. (Also available from Columbia University Press, International Documents Service, New York 27, N. Y.) Part 2 (International Trade) completes the Yearbook of Fishery Statistics, 1952-53. Part I (Production and Craft) appeared earlier in 1955. The time series in Part 2 is confined generally to the 5 postwar years, 1949-53, which, wherever possible, are compared with a single prewar year, usually 1938. For most of the countries, figures for other years may be found in preceding editions of the Yearbook, particularly the third issue (1950-51). Section I contains 3 summaries showing world trade in fishery products by continent and commodity. Twelve summary tables are presented in Section II—one for each of the commodity groups. These show country totals and continental and world aggregates of quantities and values. The 5 tables appearing in Section III present imports and exports of certain fishery products which, although included in the tables of Section II as components of the respective commodity groups, are shown individually because of their relative international significance. The last 6 Sections, IV-IX (one for each continent), present, for each of the 110 customs territories, listed in the English alphabetical order, a table showing the imports and exports of fishery products. These country tables give the quantities and values

for the detailed items appearing in the national publications. These items, broken down for the quantities by country of origin and destination are arranged by commodity groups.

Fish and Wildlife, The Story of the Work of the U. S. Fish and Wildlife Service, C. B. Colby, 48 pp., illus., printed, \$1.25. Coward-McCann, Inc., New York, N. Y., 1955.

Fishes of the Family Percophididae from the Coasts of Eastern United States and the West Indies, with Descriptions of Four New Species, by Isaac Ginsburg, 17 pp., illus., printed. (Reprinted from Proceedings of the United States National Museum, vol. 104, no. 3347, pp. 623-639.) Smithsonian Institution, U. S. National Museum, Washington, D. C., 1955.

Fishes of the Gilbert Islands, by John E. Randall, Atoll Research Bulletin No. 47, 258 pp., illus., processed. The Pacific Science Board, National Academy of Sciences, National Research Council, Washington, D. C., August 31, 1955.

Florida's Commercial Fisheries, by Carter C. Osterbind with the assistance of Elise C. Jones, State Economic Studies No. 7, 175 pp., illus., printed, \$3. Bureau of Economic and Business Research, College of Business Administration, University of Florida, Gainesville, Fla., 1955. A study in four parts of the marketing practices of Florida's commercial fisheries, the location of markets, production and production methods, economic developments, and economic importance. Part I discusses Florida's out-of-state seafood markets, covering the important markets, the scope of the consumer market, consumer preferences and practices influencing seafood markets, and role and influence of buyers in central wholesale markets. Part II discusses commercial fishing operations: practices, production, and costs; and points out the characteristics of the fishing operations and of the individual firms involved in these operations. It also illustrates the extent to which these characteristics are responsible for the problems under discussion and suggests adaptations necessary to meet the need for better marketing practices. Part III discusses the economic developments of the fisheries of Florida, showing (1) the broad outlines of the development from 1880 (the earliest date for which statistics are available) to 1953; (2) certain regional characteristics of the early and more recent developments; and (3) annual characteristics of the landings for the 15-year period from 1939 to 1953. Part IV discusses the economic importance of Florida's fisheries and the outlook for the future. Appendix I summarizes the replies to questions raised in interviews with Atlanta and Birmingham seafood wholesalers and chain-store buyers. Appendix II describes the survey of the Florida fisheries and the sampling procedure. Appendices III and IV give statistical data on the production and value of Florida's fisheries.

"Fluctuations in Abundance of the Giant Scallop, Placopecten magellanicus (Gmelin), in the Digby Area of the Bay of Fundy," by L. M. Dickie,

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

article, *Journal of the Fisheries Research Board of Canada*, vol. XII, no. 6, 1955, pp. 797-857, illus., printed. Fisheries Research Board of Canada, Ottawa, Canada. Fluctuations in total landings and in catch per boat have characterized the Digby scallop fishery since it began in 1920. An analysis of records of the fishery indicates that, although changes in fishing methods have been partly responsible for early changes in catch, their influence in recent years has been small and changes in abundance have been primarily responsible for fluctuations in the fishery since it reached its full development in the mid-thirties. Changes in abundance are assessed from analyses of catch records, special "census fishing" techniques, submarine photography, and marking experiments. Estimates from the different methods correspond. Scallops are recruited into the catchable population as six-year-old year-classes. Abundance is high when these recruited year-classes are strong, but is low when they are weak. Abundance in any year is correlated with water temperature six years previously. Both abundance and the strength of individual year-classes are correlated with water temperatures which prevailed at the time the scallops were present as pelagic larvae. It is concluded that changes in the abundance of the catchable scallop stocks result from the combined action of temperature and circulation on the pelagic larvae. Low temperatures retard larval development, and are indicative of the great exchange of water in the Bay of Fundy with outside water masses. This apparently leads to heavy losses of the larvae from the Bay, poor sets on the parent beds, weak year-classes, and low abundance of the catchable stocks of six years later. High temperatures speed larval development and are indicative of a closed Fundy circulation which holds the larvae in the vicinity of the parent beds. This leads to good sets, strong year-classes, and high abundance of the catchable stocks six years later.

Frogs of Southeastern Brazil, by Doris M. Cochran, Bulletin 206, 423 pp., illus., printed, \$2. Smithsonian Institution, Washington 25, D. C., 1955.

The General Agreement on Tariffs and Trade, Negotiations Under the Trade Agreement Act of 1934 as Amended and Extended (Supplemental Notice of U. S. Intention to Negotiate; Supplemental List of Products to be Considered; Notice of Supplemental Public Hearings by Committee for Reciprocity Information), Department of State Publication 6183, Commercial Policy Series 153, 19 pp., processed, 15 cents. Department of State, Washington, D. C., December 1955. (For sale by the Superintendent of Documents, Government Printing Office, Washington 25, D. C.)

Highway to the North, by Frank Illingworth, 293 pp., illus., printed, \$7.50. Philosophical Library, Inc., 15 E. 40th St., New York 18, N. Y. The author, a Briton, details his experiences in this travelog of his journey (in reality, a report of 2 separate journeys) from his London home to the Arctic wasteland of North America.

Although the book purports to be an account of people and places, the author admits of "inaccuracies which can creep into a book," and they do. From Dawson Creek in British Columbia, Canada, the author's journeys take him 1,500 miles via the Alaska Highway to Whitehorse in Yukon Territory, and to Fairbanks, Alaska. By air, visits are made to other places in Alaska, notably Kotzebue, a picturesque Eskimo village, headquarters for several "white" traders. Like numerous others who have journeyed to Alaska and the Arctic to see and learn for himself, Frank Illingworth tells of numerous old timers and their colorful recollections. Little mention is made of fish or fisheries or the resources of the northern seas. Some mention is made of fishing through the ice for tomcod, a small species of codfish commonly used as food for both the Eskimos and their dogs.

--N. B. Wigutoff

How to Collect Shells, 75 pp., printed, \$1. American Malacological Union, Marinette, Wis., 1955.

(ICA) Operations Report, November 16, 1955, FY 1955, Issue No. 4, 114 pp., illus., processed. Statistics and Reports Division, Office of Research, Statistics and Reports, International Cooperation Administration, Washington 25, D. C. In addition to the usual tables and data, discusses The Mutual Security Program for Fiscal Year 1956.

Mammals, A Guide to Familiar American Species, by Herbert S. Zim and Donald F. Hoffmeister, (A Golden Nature Guide), 160 pp., illustrated by James Gordon Irving in color, printed, \$1.95. Simon and Schuster, New York, N. Y. Consists principally of illustrations with descriptive text and includes among the many mammals, sea mammals such as porpoises, dolphins, and whales.

Memoirs of the Faculty of Fisheries, Hokkaido University, vol. 3, no. 1, 93 pp., illus., printed. Contains this paper: "Studies on the Proteins of the Meat of Sea Cucumber (*Stichopus japonicus* Selenka)" by E. Tanikawa. The Faculty of Fisheries, Hokkaido University, Hakodate, Japan, 1955.

Mesa Redonda Sobre la Industrializacion de los Recursos Marinos Cubanos (Round Table on the Industrialization of the Marine Resources of Cuba), Mayo 27, 28 y 29, 1955, processed in Spanish. Departamento de Publicidad y Actividades Sociales, Universidad de Oriente, Santiago, Cuba. Includes, among others, the following articles: "Sugerencias para el Mejoramiento de las Artes y los Metodos de Pesca en Cuba," by Jose A. Suarez Caabro; "Los Factores Geograficos en la Produccion Pesquera," by Dr. Gerardo A. Canet; "Peces Comestibles y Comerciables de Cuba," by Luis Howell Rivero; "Biologia y Tecnologia en la Industria del Ostion," by Isabel Perez Farfante; "Informe Sobre las Investigaciones Realizadas con Algas Marinas Cubanas Industrializables," by Felix Solonis; "Resultados de la Primera Investigacion Sobre Posibilidades Industriales

THESE PUBLICATIONS ARE NOT AVAILABLE FROM THE FISH AND WILDLIFE SERVICE, BUT USUALLY MAY BE OBTAINED FROM THE ORGANIZATION ISSUING THEM.

con Algas Marinas de las Costas de la Provincia de Oriente," by M. Díaz-Piñer; "Necesidad de Incluir en los Programas de Estudios de las Escuelas Cubanas los Temarios Sobre Biología Marina," by Dr. Manuel W. Aguilera Barciela; and "Importaciones Cubanas de Pescado," by Dr. Byron White.

Peces Comunes de la Costa Peruana (Common Fish of the Peruvian Coast) Serie de Divulgación Científica no. 6, 123 pp., illus., processed in Spanish. Ministerio de Agricultura, Dirección de Pesquería y Caza, Lima, Peru, 1955. Shows a sketch, the common English and Spanish names, scientific name, and a short description of each species included.

Philippine Fisheries Yearbook, 1953, 343 pp., illus., printed. Bureau of Fisheries, Manila, Philippines. This is the initial number of the Philippine Fisheries Yearbook. It is intended to help bring about greater expansion and improvement in the fishing industry and thus increase its usefulness by increasing opportunities for employment and making the Philippines--a fish-consuming country--self-sufficient in fish. The Yearbook contains many interesting articles, some of which are: "The Economic Significance of the Introduction of Tilapia in the Philippines;" "Culture Tilapia--for Food and Profit;" "A New Opportunity for Filipinos: Trawling in Oceanic Waters;" "Conversion of LCM's for Otter Trawl and Basnet Fishing;" "Electronic Fish Finder;" "Handling and Processing of Some Fisheries Products in Southern Philippines;" "Know the Food Value in Your Favorite Fish;" "Fisheries Statistics of the Philippines, 1952;" "Philippine Commercial Fishing Craft & Gear;" and "Common Philippine Market Fish." A directory of the Philippine fishing industry, containing the names of manufacturers and dealers, etc., is also included.

Reptiles and Amphibians, A Guide to Familiar American Species, by Herbert S. Zim and Hobart M. Smith. (A Golden Nature Guide), 157 pp., illustrated by James Gordon Irving in color, printed, \$1.50. Simon and Schuster, New York, N. Y. Consists chiefly of illustrations with descriptive text and includes turtles, frogs, alligators, and crocodiles.

"Småtrålerens lønnsomhet, 1954," by Arthur Holm, article, Fiskets Gang, vol. 41, no. 45, November 10, 1955, pp. 598-603, printed in Norwegian with summary in English. Fiskeridirektøren, Postgato nr. 861 81, Bergen, Norway. The cost investigations of Norwegian trawlers of less than 300 gross tons are based on samples of accounts collected from the shipowners.

A Technique for the Spectral Analysis of Sound in the Ocean, by Paul Ferris Smith, Joseph D. Richard, and Frank H. Stephens, Contribution No. 143, 6 pp., illus., printed. (Reprinted from Transactions, American Geophysical Union, vol. 36, no. 3, June 1955, pp. 413-418) Marine Laboratory, University of Miami, Coral Gables, Fla. A method is given for presenting a continuous quantitative spectrum of sound in the ocean. A more detailed spectrum is obtained

than from previous methods with the advantage of convenient and rapid operation. The technique has proved useful in the analysis of sub-surface oceanic sounds, examples of which are given, and will facilitate the analysis of oceanographic noise spectra of meteorological, biological, or volcanic origin. The method is based upon a modification and adaptation of a commercially-available heterodyne type sonic analyzer with cathode ray tube presentation. Provisions for photographic recording have been added.

The Tohoku Journal of Agricultural Research, vol. 5, no. 4, 111 pp., illus., printed, March 1955. Faculty of Agriculture, Tohoku University, Sendai, Japan. Contains, among others, the following articles: "Studies on the Protein Hydrolysis for the Lysine Estimation in Feed," by F. Kondo and T. Hatano; "Ecology of Oyster Bed. I. On the Decline of Productivity Due to Repeated Cultures," by S. Ito and T. Imai; and "Fatty Acids Composition of Sauri Oil by Spectrophotometric Method," by Y. Tsuchiya and M. Kayama.

(Union of South Africa) Twenty-Fifth Annual Report of the Division of Fisheries, Department of Commerce and Industries (For the Period 1st April, 1953--31st March, 1954), by Dr. J. M. Marchand, 162 pp., printed. (Reprint from Commerce & Industry, July 1955.) The Government Printer, Pretoria, South Africa, 1955. A review of the deep-sea and inshore fisheries of South Africa, with special reference to trawling; whaling; and the pilchard, rock lobster, and line fisheries. Contains also chapters on research at sea and ashore, fishing harbors, and the pilchard research program.

Water, The Yearbook of Agriculture 1955, 751 pp., illus., printed, \$2.00. U. S. Department of Agriculture, Washington 25, D. C. (For sale by Superintendent of Documents, Washington 25, D. C.). The purpose of this Yearbook is to supply as much information as possible about water in a practical, useful way for farmers and others who use and are interested in water and its resources. The committee that planned the scope of the book set forth this aim at the start for the guidance of the men who wrote the chapters: "Our primary aim is to explain the nature, behavior, and conservation of water in agriculture..." Although some of the broad problems are forecast, the main emphasis is on the facts and basic principles that will help people in reaching the best decisions regarding water resources. Hydroelectric power, navigation, industrial use, pollution, and other aspects are touched on, but this book is concerned principally with water in agriculture. However, incidentally throughout the book there are references to fish, fisheries, fishing, fertility of fishing waters, and the work of the U. S. Fish and Wildlife Service in relation to water. The principal subjects covered by the book include our need for water, where we get our water, water and our soil, caring for our watersheds, and the relationship between water and our forests, irrigation, our crops, our ranges and pastures, wildlife, farms, and cities. A section of the book is devoted to a look to the future on water problems and their solution.

CONTENTS (CONTINUED)

	Page		Page
TRENDS AND DEVELOPMENTS (Contd.):		FOREIGN (Contd.):	
U. S. Foreign Trade:		Norway (Contd.):	
Groundfish Fillet Imports Down 6 Percent in		1955 Mackerel Season	55
November 1955	38	New Whale Catcher Largest Ever Built	55
Edible Fishery Products, September 1955	38	Herring Catch Lower in 1955	56
Wholesale Prices, November 1955	39	Fishery Byproducts Plants Install Equipment to	
FOREIGN:	41	Recover Stickwater	56
International:		Peru:	
General Agreement on Tariffs and Trade:		New Whaling Company Formed	56
Review of Tenth Session	41	Defense of Territorial-Waters Claim	57
Territorial Waters:		Portugal:	
Third Meeting by Peru, Chile, and Ecuador on		Fisheries Trends, August 1955	57
Territorial Waters	42	Fisheries Trends for 1955--Correction	58
Australia:		Canned Fish Pack, January-June 1955	58
New Tuna Products Introduced	42	Canned Fish Exports, January-August 1955	58
Brazil:		Services of Hospital Ship Offered to Canadian	
Spiny Lobster Fishery in Northeastern Brazil ..	43	Fishermen	59
Canada:		Tax on Offshore Tuna Catch Reduced	60
Newfoundland's Economic Fisheries Prospects		South-West Africa:	
Presented to Royal Commission	44	Pilchard-Maasbanker Fishery	61
Growth of the Fish Stick Industry	45	Thailand:	
New Labeling Regulations Proposed for Fishery		Shrimp Fisheries	61
Products	45	Union of South Africa:	
Colombia:		Fishery Trends, October-November 1955	62
Fish Cannery Finances Herring Exploratory Fish-		Venezuela:	
ing	46	Japanese Tuna Long-Liner Starts Fishing	62
Denmark:		FEDERAL ACTIONS:	63
International Fisheries Fair to be Held in Copen-		Federal Trade Commission:	
hagen	47	Frozen Food Industry Trade Practice Rules ...	63
Ecuador:		Tariff Commission:	
Fish and Shellfish Exports, 1954--Correction ..	47	Investigation of Injury to Domestic Producers by	
El Salvador:		Groundfish Fillet Imports	64
New Marine Fishing Law Issued	47	Eighty-Fourth Congress (Second Session), January	
German Federal Republic:		1956	64
Seaweed Flour	48	FISHERY INDICATORS:	67
Iceland:		Chart 1 - Fishery Landings for Selected States ..	67
Russian-Icelandic Trade Agreement, 1956	48	Chart 2 - Landings for Selected Fisheries	68
Indonesia:		Chart 3 - Cold Storage Holdings and Freezings of	
Shrimp Fisheries	49	Fishery Products	69
Japan:		Chart 4 - Receipts and Cold-Storage Holdings of	
Developing Good Tuna Fishery in Indian Ocean ..	50	Fishery Products at Principal Distribution	
Long-Lining for Salmon Proposed	50	Centers	70
Long-Liner Preserves Tuna by "Air Freezing".	50	Chart 5 - Fish Meal and Oil Production - U. S. &	
Mexico:		Alaska	70
Review of Fishing Industry	51	Chart 6 - Canned Packs of Selected Fishery Products	
Netherlands:		Chart 7 - U. S. Fishery Products Imports	72
Whaling Production, 1954/55	53	RECENT FISHERY PUBLICATIONS:	73
Norway:		Fish and Wildlife Service Publications	73
Fishery Trends, December 1955	54	Miscellaneous Publications	74



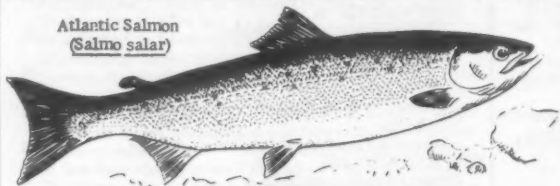
SALMONS

There are five North American species of Pacific salmon and one additional Asian species. There is one marine Atlantic salmon and three landlocked species.

Five species of salmon inhabit the waters of the Pacific coast of North America. These are the pink or humpback salmon; the king or chinook salmon; the red, sockeye, or blueback salmon; the silver or coho salmon; and the chum, keta, or dog salmon. These five species belong to the genus Onchorhynchus of the family Salmonidae (salmons and trouts).

These five salmon species occur also in the western Pacific, generally from Kamchatka to the island of Hokkaido in northern Japan. A sixth species (Onchorhynchus masu), called masu in Japan, is found from southern Japan northward to the Island of Sakhalin; the masu is an important commercial fish in Japan but is less valuable than any of the five American species.

Atlantic Salmon
(Salmo salar)



Fishery Leaflet 14, "Pacific Salmons," discusses the general life history of the Pacific salmon--eggs, food, migration, and importance; describes each species individually giving the range, fresh-water life, ocean life, age at maturity, length and weight, and time of run; and includes a table showing the commercial catch of salmon in Pacific Coast States and Alaska, 1947-52.

There is only one marine Atlantic salmon, which once was abundant in most larger New England rivers and in many smaller streams. Today there are only remnants of the New England runs, in the Penobscot and Dennys Rivers and a few streams in the eastern part of Maine. In Canada, rivers of the Maritime Provinces still have substantial runs.

Fishery Leaflet 176, "Atlantic Salmon (Salmo salar)" discusses what is known about the Atlantic salmon, including migrations, spawning, eggs, fresh-water life, and the cooperative program of salmon rehabilitation conducted in Maine by the U. S. Fish and Wildlife Service and the Atlantic Sea Run Salmon Commission of the State of Maine.

There are also three landlocked species: the Sebago salmon, Salmo salar sebago, which lives in northern New England; the ouananiche, S. S. ouananiche, which is found in Quebec; and the kokanee, Oncorhynchus nerka kokanee, from the Pacific northwest.

Copies of these fishery leaflets are available free from the Division of Information, U. S. Fish and Wildlife Service, Washington 25, D. C.

